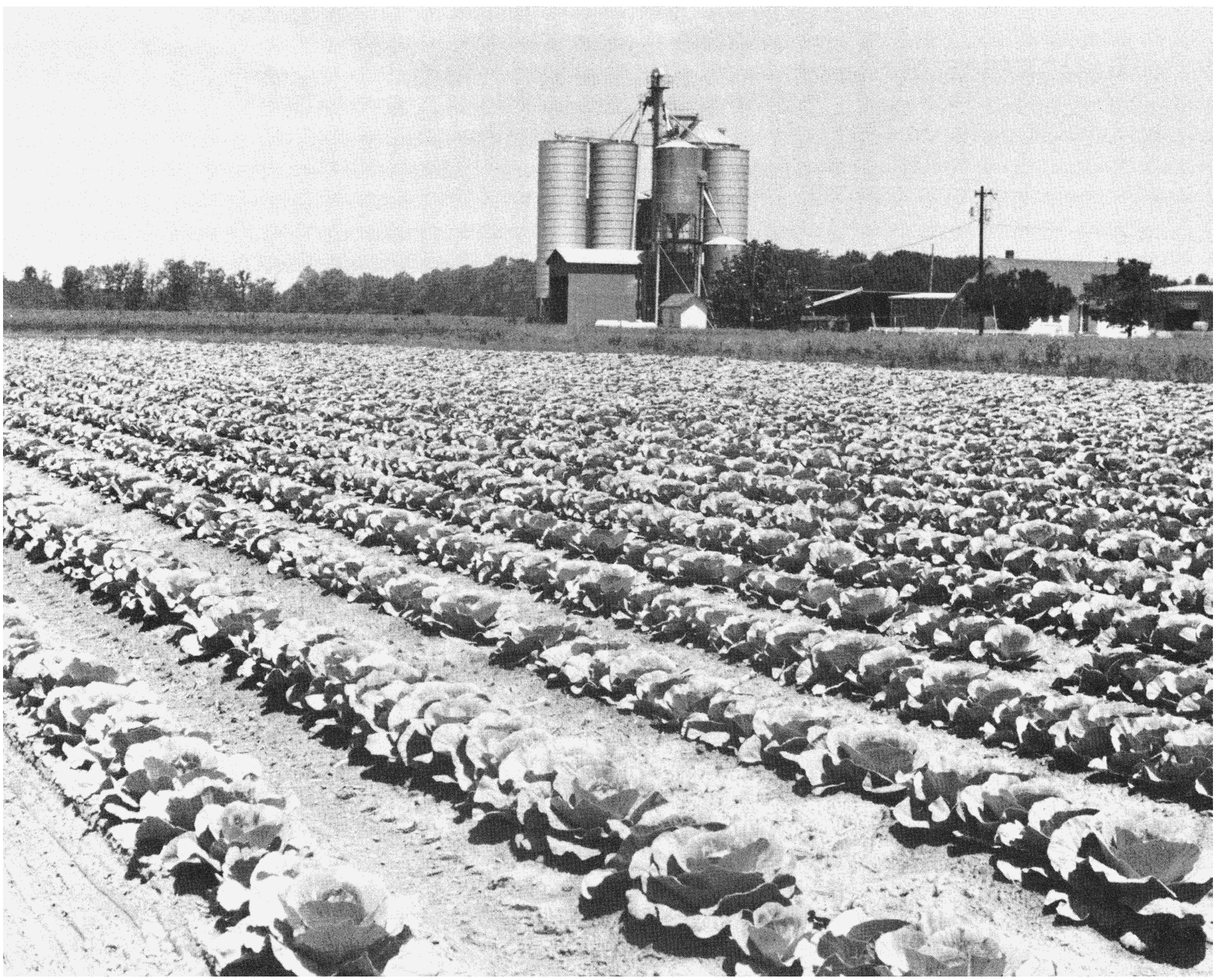
United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with North Carolina Department of Environment, Health, and Natural Resources; North Carolina Agricultural Research Service; North Carolina Cooperative Extension Service; Albemarle Soil and Water Conservation District; and Camden County Board of Commissioners

Soil Survey of Camden County, North Carolina



How To Use This Soil Survey

General Soil Map

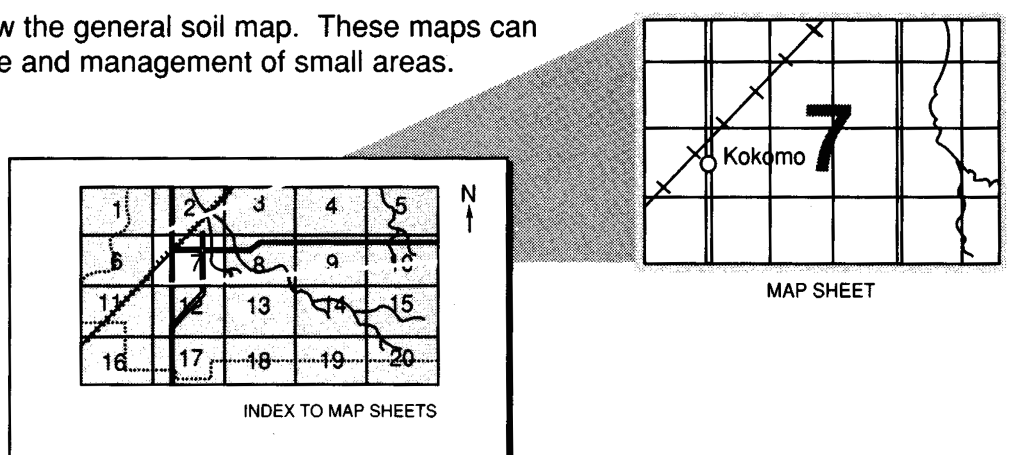
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

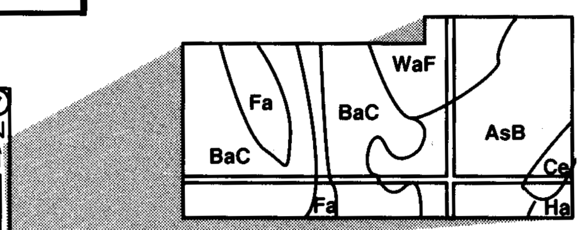
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the North Carolina Agricultural Research Service, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1987. Soil names and descriptions were approved in 1988. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This soil survey was made cooperatively by the Natural Resources Conservation Service; the North Carolina Department of Environment, Health, and Natural Resources; the North Carolina Agricultural Research Service; and the North Carolina Cooperative Extension Service. The survey is part of the technical assistance furnished to the Camden County District Board of the Albemarle Soil and Water Conservation District. The Camden County Board of Commissioners provided financial assistance for the survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The first soil survey of Camden County was published in 1928 by the U.S. Department of Agriculture *(6)*. This survey updates the first survey, provides more detailed maps on aerial photographs, and contains more interpretive information.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: An area of Perquimans silt loam, 0 to 2 percent slopes, used for cabbage, one of the major truck crops grown in Camden County.

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Issued July 1995

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Foreword

This soil survey contains information that can be used in land-planning programs in Camden County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

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State Conservationist
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Soil Survey of Camden County, North Carolina

By Phillip L. Tant, Natural Resources Conservation Service

Soils Surveyed by Phillip L. Tant and John A. Gagnon, Natural Resources Conservation Service, and Timothy A. Dilliplane and W. Allen Hayes, North Carolina Department of Environment, Health, and Natural Resources

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
North Carolina Department of Environment, Health, and Natural Resources; North Carolina Agricultural Research Service; North Carolina Cooperative Extension Service; Albemarle Soil and Water Conservation District; and Camden County Board of Commissioners

CAMDEN COUNTY is in the northeastern part of North Carolina (fig. 1). It has a total land area of 153,913 acres. In 1988, it had a population of 6,100 *(14)*.

The county is in the Coastal Plain physiographic region. Elevation ranges from near sea level to 24 feet above sea level at the western edge of the Great Dismal Swamp.

General Nature of the County

This section provides general information concerning the county. It describes history and development, water supply, and climate.

History and Development

The area that is now Camden County was originally inhabited by the Pasquotank and Poteskeet Indians, who were members of the Algonquin tribe. According to early accounts by explorer John Lawson, some of the Indians grew corn, potatoes, tobacco, beans, peas, and many other vegetables. Game and fish were plentiful.

In about 1612, the population of Jamestown, Virginia, began to increase. Most of the good sites along navigable streams were occupied, and in places the soil quality was deteriorating. The desire for "fertile bottom lands" and fresh hunting grounds caused explorers, hunters, traders, and farmers to follow the streams of southeastern Virginia into the area of Albemarle Sound in what is now Camden County.

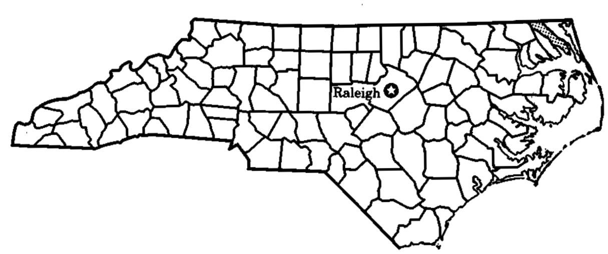

Figure 1.—Location of Camden County in North Carolina.

In 1649, a London newspaper describing the area said, "The soyle is for the most part of black mould about two foot deepe. You may trust it with anything. The Indians corne yields 200 for one, they have two crops in six months."

In 1777, Camden County was organized from part of Pasquotank County. It was named in honor of the English jurist Sir Charles Prat, Earl of Camden. The county seat was originally called Jonesborough, but the name was changed to Camden a few years later.

The Great Dismal Swamp, which is located in the

northern part of the county, greatly contributed to the history and economic development of the county. Rights to the swamp were controlled at one time by the Dismal Swamp Land Company. Among those in the company were George Washington and Patrick Henry. Gersham Nimmo, a surveyor for the company, discovered that the western side of the swamp is much higher than the eastern side and that the rivers run out of the swamp instead of into it *(3)*.

George Washington wrote, "The swamp is neither a plain nor a hollow, but it is a hillside, and Lake Drummond, which lies at the center of the swamp is 25 feet above the sea over which it leans, yet contains it's own moisture like a bowl."

During the late 18th century, juniper shingles began to replace thatch as roofing material in Europe and the West Indies. Juniper trees were abundant in the Great Dismal Swamp. In 1793, the Great Dismal Swamp Canal was begun to facilitate removal of juniper shingles from the swamp. Corduroy roads interlaced the swamp, allowing shingles to be hauled out by mules. The shingles were loaded onto small boats called "shingle flats" and hauled up the canal by mules on a towpath. Between 1839 and the beginning of the Civil War, the canal was deepened and widened, allowing thousands of shingle boats, as well as freighters, stern wheel steamers, and schooners, to cross the swamp. This time period was considered the golden age of the canal *(5)*.

Today, most of the juniper has been harvested. Much of what used to be the Great Dismal Swamp has been drained and cleared to plant corn and soybeans. Most of the remaining swamp is a National wildlife refuge. Corn, soybeans, wheat, potatoes, and cabbage are still grown in the southern part of the county.

Water Supply

Ground water is the only source of usable water in Camden County. The county is underlain by thousands of feet of sedimentary material. The depth to salt water is normally more than 100 feet in the northern half of the county and less than 100 feet in the southern half. The fresh water is in the upper part of the sandy aquifer. The water from shallow wells ranges from soft to very hard and generally contains excessive amounts of iron. The fresh water from the deeper wells is normally hard and may also contain excessive amounts of iron *(4)*.

Climate

Camden County is generally hot and humid in summer, but sea breezes frequently cool the coastal areas. Winter is cool and occasionally has brief cold periods. Prolonged droughts are rare, and annual precipitation is adequate for most of the crops commonly grown in the county. Snowfall is rare.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Elizabeth City, North Carolina, in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 42 degrees F and the average daily minimum temperature is 32 degrees. The lowest temperature on record, which occurred at Elizabeth City on January 13, 1962, is 4 degrees. In summer, the average temperature is 77 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Elizabeth City on July 23, 1952, is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 49 inches. Of this, 27 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 22 inches. The heaviest 1-day rainfall during the period of record was 6.7 inches at Elizabeth City on October 20, 1968. Thunderstorms occur on about 43 days each year.

The average seasonal snowfall is about 2 inches. The greatest snow depth at any one time during the period of record was 4 inches.

The average relative humidity in midafternoon is about 65 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 13 miles per hour, in winter.

Every few years a hurricane crosses the area.

How This Survey Was Made

This survey was made to provide information about the soils in Camden County. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of

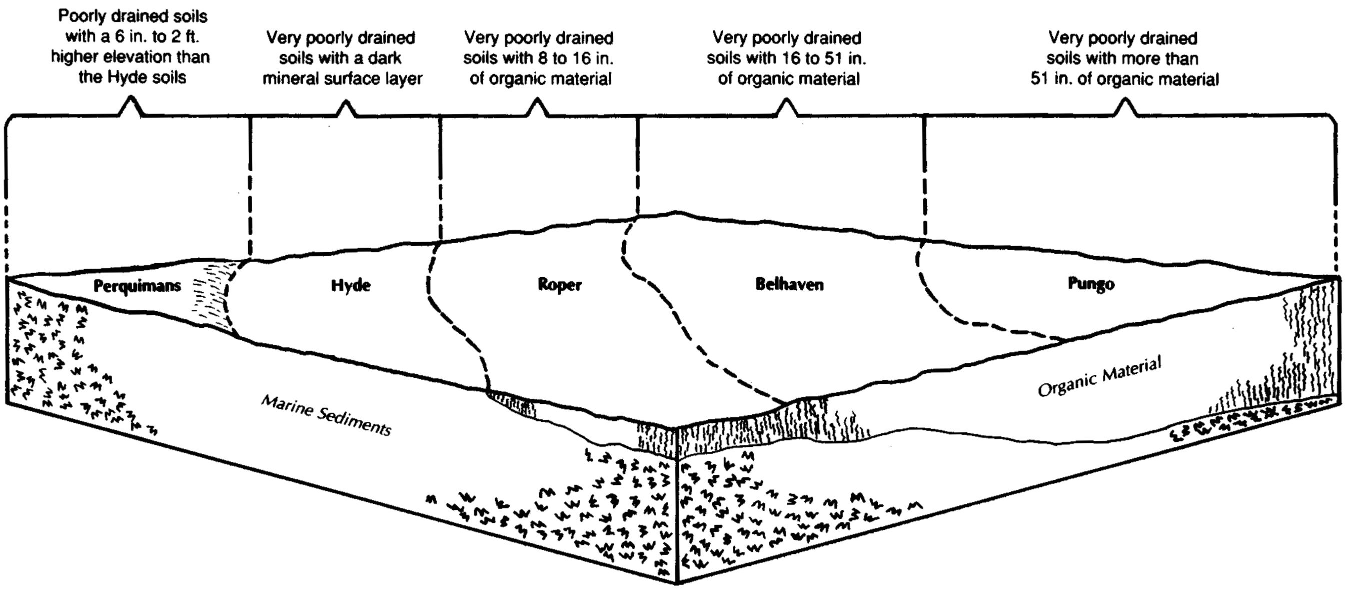

Figure 2.—Selected mineral and organic soils near Hales Lake.

slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They studied many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Soils occur in an orderly pattern that results from the combined influence over time of climate, parent material, relief, and plants and animals (fig. 2). Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. This model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify the soils. After describing the soils and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. The data from these analyses and tests and from field-observed characteristics and soil properties are used to predict behavior of the soils under different uses. Interpretations are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information,

production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a relatively high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will be at a specific level in the soil on a specific date.

Soil boundaries are drawn on aerial photographs and each delineation is identified as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in accurately locating boundaries.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soils. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called minor soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are identified in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Pungo-Belhaven

Nearly level, very poorly drained soils that have a surface layer of muck and loamy or clayey underlying material; on broad flats

This unit is dominantly in the northern part of the county, in the area of the Great Dismal Swamp and Hales Lake. It makes up about 29 percent of the land area in the county. It is about 53 percent Pungo soils, 30 percent Belhaven soils, and 17 percent soils of minor extent. The minor soils include Cape Fear, Dorovan, Roper, and Wasda soils.

The surface layer of the Pungo soils is black muck. Below this, in sequence downward, are layers of black muck, dark reddish brown muck, and black muck. The underlying material is gray loam.

The surface layer of the Belhaven soils is dark reddish brown muck. Below this is very dusky red muck. The underlying mineral layers are dark brown loam in the upper part, grayish brown clay loam in the next part, and light gray sandy clay loam in the lower part.

The major soils are used almost exclusively for woodland and wildlife habitat. Wetness, low strength, and a high content of logs, stumps, and roots in the organic layers are the main limitations affecting these uses.

The main limitations affecting agricultural uses are wetness and a high content of logs, stumps, and roots in the organic layers. The main limitations affecting urban and recreational uses are the wetness, excess humus, seepage, and low strength.

2. Dorovan-Chowan

Nearly level, poorly drained and very poorly drained soils that have a surface layer of muck or loamy material and are underlain by muck; on flood plains

This unit is on the flood plains along Albemarle Sound and the North and Pasquotank Rivers and their tributaries. It makes up about 21 percent of the land area in the county. It is about 78 percent Dorovan soils, 17 percent Chowan soils, and 5 percent soils of minor extent. The minor soils include Belhaven, Hobonny, and Pungo soils.

The very poorly drained Dorovan soils have a surface layer of dark reddish brown muck. Below this is black muck.

The poorly drained Chowan soils have a surface layer of dark gray silt loam. The underlying material is gray silty clay loam. Below this is dark reddish brown muck.

The major soils are used almost exclusively for woodland and wildlife habitat. Wetness, frequent flooding, poor trafficability, and low strength are the main limitations affecting these uses.

The major soils generally are not used for cropland or urban or recreation development. The main limitations are wetness, frequent flooding, and low strength.

3. Perquimans-Roanoke-Tomotley

Nearly level, poorly drained soils that have a loamy surface layer and loamy or clayey underlying material; on broad flats

This unit is throughout the county. It makes up about 31 percent of the land area in the county. It is about 34 percent Perquimans soils, 30 percent Roanoke soils, 25

percent Tomotley soils, and 11 percent soils of minor extent. The minor soils include Altavista, Augusta, Cape Fear, Chapanoke, Hyde, Munden, Nimmo, Portsmouth, Wasda, and Yeopim soils.

The surface layer of the Perquimans soils is dark grayish brown silt loam. The subsoil is light gray silt loam in the upper part, light brownish gray and light gray loam in the next part, and gray sandy clay loam in the lower part. The underlying material is grayish brown fine sandy loam.

The surface layer of the Roanoke soils is grayish brown silt loam. The subsurface layer is grayish brown silt loam. The subsoil is gray and light gray clay and clay loam in the upper part and grayish brown loam in the lower part. The underlying material is loam. It is gray in the upper part and dark gray in the lower part.

The surface layer of the Tomotley soils is dark grayish brown fine sandy loam. The subsoil is grayish brown sandy clay loam in the upper part, gray sandy clay loam in the next part, and grayish brown and light brownish gray sandy clay loam and sandy loam in the lower part. The underlying material is gray loamy sand.

The major soils are used mainly as cropland or woodland. Wetness is the main limitation affecting these uses.

The main limitations affecting urban and recreational uses are wetness in the Tomotley and Perquimans soils and wetness and slow permeability in the Roanoke soils.

4. Portsmouth-Hyde-Cape Fear

Nearly level, very poorly drained soils that have a loamy surface layer and loamy or clayey underlying material; on broad flats

This unit is dominantly in the northern part of the county. It makes up about 12 percent of the land area in the county. It is about 38 percent Portsmouth soils, 32 percent Hyde soils, 16 percent Cape Fear soils, and 14 percent soils of minor extent. The minor soils include Perquimans, Roanoke, Roper, Tomotley, and Wasda soils.

The surface layer of the Portsmouth soils is black fine sandy loam. The subsoil is grayish brown sandy clay loam. The underlying material is light gray sand.

The surface layer of the Hyde soils is black silt loam. The subsoil is dark gray silty clay loam in the upper part, dark grayish brown and light brownish gray silt loam and loam in the next part, and light gray clay loam in the lower part. The underlying material is gray fine sandy loam.

The surface layer of the Cape Fear soils is very dark gray silt loam. The subsoil is light brownish gray clay loam in the upper part, grayish brown clay in the next part, and gray clay loam and loam in the lower part. The underlying material is greenish gray and dark greenish gray loam.

The major soils are used mainly as cropland or woodland. Wetness is the main limitation affecting these uses.

The main limitations affecting urban and recreational uses are wetness, seepage, and the instability of cutbanks in areas of the Portsmouth soils; wetness in the Hyde soils; and wetness, slow permeability, and low strength in the Cape Fear soils.

5. Altavista-Yeopim-Munden

Nearly level, moderately well drained soils that have a loamy surface layer and loamy underlying material; on uplands

This unit is on smooth ridges near small streams and rivers that flow into Albemarle Sound. It makes up about 7 percent of the land area in the county. It is about 23 percent Altavista soils, 19 percent Yeopim soils, 14 percent Munden soils, and 44 percent soils of minor extent. The minor soils include Augusta, Bojac, Chapanoke, Chowan, Dorovan, Seabrook, and State soils.

The surface layer of the Altavista soils is dark grayish brown fine sandy loam. The subsoil is yellowish brown sandy clay loam in the upper part and light yellowish brown fine sandy loam in the lower part. The underlying material is yellowish brown loamy fine sand.

The surface layer of the Yeopim soils is dark grayish brown silt loam. The subsoil is yellowish brown silt loam in the upper part, light yellowish brown silty clay loam in the next part, and light yellowish brown loam in the lower part. The underlying material is fine sandy loam. It is light gray in the upper part and light yellowish brown in the lower part.

The surface layer of the Munden soils is dark grayish brown loamy sand. The subsoil is sandy loam. It is yellowish brown in the upper part, brownish yellow in the next part, and light brownish gray in the lower part. The underlying material is sand. It is yellow in the upper part and light gray in the lower part.

The major soils are used as cropland or woodland. Wetness is the main limitation affecting these uses. The main limitation affecting urban and recreational uses is also wetness.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under the heading "Use and Management of the Soils."

The map units on the detailed soil maps represent areas on the landscape and consist mainly of one or more soils for which the units are named.

Symbols identifying the soils precede the map unit names in the map unit descriptions. The descriptions include general facts about the soils and give the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are named as phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Dorovan muck, 0 to 1 percent slopes, frequently flooded, is a phase of the Dorovan series.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils may be identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and suitabilities for many uses. The "Glossary" defines many of the terms used in describing the soils.

AaA—Altavista fine sandy loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on smooth ridges near streams. Individual areas are irregular in shape and range from 5 to 75 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 6 inches thick. The subsoil is 44 inches thick. It is yellowish brown sandy clay loam in the upper part and light yellowish brown fine sandy loam in the lower part. The underlying material to a depth of 60 inches is yellowish brown loamy fine sand.

Included with this soil in mapping are small areas of State, Munden, and Augusta soils. The somewhat poorly drained Augusta soils are in slight depressions. The well drained State soils are in slightly elevated areas. The moderately well drained Munden soils have less clay in the subsoil than the Altavista soil and are in scattered areas throughout the unit. Included soils make up about 10 to 15 percent of the map unit.

Permeability is moderate or moderately rapid in the Altavista soil. Available water capacity is moderate. Reaction is extremely acid to medium acid throughout the profile, except where the surface layer has been limed. The seasonal high water table is at a depth of 1.5 to 2.5 feet.

Most of the acreage is cultivated. The rest is used mainly as pasture or woodland.

The major crops are corn, soybeans, and small grain. Seasonal wetness is the main limitation. Winter cover crops, conservation tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water.

The dominant native trees are yellow-poplar, sweetgum, hickory, red maple, American beech, willow oak, white oak, post oak, northern red oak, southern red oak, water oak, and loblolly pine. The understory is mainly dogwood, sweetbay, sourwood, American holly,

waxmyrtle, and sassafras. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is wet results in ruts, compacts the soil, and damages the roots of the trees.

The main limitation affecting urban and recreational uses is wetness. It can be minimized by a drainage system consisting of perforated drain tile, ditches, or both.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

AtA—Augusta fine sandy loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is in shallow depressions and on low, smooth ridges near streams. Individual areas are irregular in shape and range from 5 to 30 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 6 inches thick. The subsoil is 38 inches thick. It is light olive brown sandy clay loam in the upper part and gray sandy clay loam and sandy loam in the lower part. The underlying material to a depth of 72 inches is light gray loamy sand.

Included with this soil in mapping are small areas of Altavista and Tomotley soils. The poorly drained Tomotley soils are in slight depressions. The moderately well drained Altavista soils are on slightly elevated knolls. Included soils make up about 10 to 15 percent of the map unit.

Permeability is moderate or moderately rapid in the Augusta soil. Available water capacity is low or moderate. Reaction is very strongly acid to medium acid throughout the profile, except where the surface layer has been limed. The seasonal high water table is within a depth of 1 to 2 feet.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, small grain, and soybeans. Wetness is the main limitation in cultivated areas. A drainage system is necessary to obtain optimum yields. Winter cover crops, conservation tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, white oak, southern red oak, and American beech. The major understory species are dogwood, sourwood, sweetbay, sassafras, and a variety of briers and reeds. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is wet results in ruts, compacts the soil, and damages the roots of trees.

The main limitation affecting urban and recreational uses is wetness. If a suitable outlet is available, the wetness can be minimized by a drainage system consisting of perforated drain tile, ditches, or both. Depth to the seasonal high water table should be considered when septic tank absorption fields are designed.

The capability subclass is IIIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9W.

BaA—Belhaven muck, 0 to 2 percent slopes. This nearly level, very poorly drained soil is on broad flats in the area of Hales Lake and the Great Dismal Swamp. Individual areas are irregular in shape and range from 50 to 300 acres in size.

Typically, the surface layer is dark reddish brown muck 6 inches thick. Below this, to a depth of 22 inches, is very dusky red muck. Mineral material underlies the muck. It extends to a depth of 72 inches or more. It is dark brown loam in the upper part, grayish brown clay loam in the next part, and light gray sandy clay loam in the lower part.

Included with this soil in mapping are small areas of Pungo, Roper, and Wasda soils. These soils are in scattered areas throughout the unit. Pungo soils are organic to a depth of more than 51 inches. Roper and Wasda soils are organic to a depth of less than 16 inches. Included soils make up about 15 percent of the map unit.

The surface layers of the Belhaven soil are highly decomposed organic material. Permeability is moderately slow to moderately rapid. Available water capacity is high. The organic layers are extremely acid, except where the surface layer has been limed. The underlying mineral layers range from extremely acid to slightly acid. Logs, roots, and stumps are common throughout the organic layers in most areas. The seasonal high water table is within a depth of 1 foot in undrained areas.

Most of the acreage is used as woodland. The rest is used mainly as cropland.

The major crops are corn, small grain, and soybeans. A drainage system is necessary in cropped areas. Applications of copper and other micronutrients and large amounts of lime are necessary to prepare the soil for agricultural uses. The common logs, roots, and stumps in the organic layers should be removed before cultivation. Subsidence exposes buried wood. As a result, root raking is needed every few years to permit the use of equipment. Spring tillage and fall harvest may be delayed because of wetness. During spring

planting, soil blowing is a hazard. It can be minimized by conservation tillage, field borders, and windbreaks.

The dominant native trees are red maple, Atlantic white cedar, pond pine, sweetgum, and baldcypress. The understory is mainly bitter galdberry, redbay, sweetbay, fetterbush lyonia, huckleberry, greenbrier, waxmyrtle, and switchcane. Wetness, low strength, and seedling mortality are the main limitations. A drainage system improves tree growth, facilitates the use of equipment, and reduces the extent of the soil damage caused by forestry activities. Bedding of rows increases the seedling survival rate. The soil has a poor load-supporting capacity. Using low-pressure ground equipment minimizes damage to the soil and helps to maintain productivity.

The main limitations affecting urban uses are wetness, excess humus, and low strength. Septic tank absorption fields function poorly because of the organic layers and the wetness. Pilings help to overcome low strength.

The main limitations affecting recreational uses are wetness and excess humus.

The capability subclass is IVw in drained areas and VIIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6W.

BoA—Bojac loamy sand, 0 to 3 percent slopes. This nearly level and gently sloping, well drained soil is on ridges near small streams that flow into Albemarle Sound, the North River, and the Pasquotank River. Most areas are oblong and irregular in width. They range from 5 to 70 acres in size.

Typically, the surface layer is brown loamy sand 8 inches thick. The subsoil is yellowish brown fine sandy loam 24 inches thick. The underlying material to a depth of 72 inches is loamy fine sand and fine sand. It is reddish yellow in the upper part, yellowish brown in the next part, and light yellowish brown in the lower part.

Included with this soil in mapping are small areas of State soils and soils having a sandy surface layer that is more than 20 inches thick. Included soils generally are in scattered areas throughout the unit. They make up about 10 percent of the map unit.

Permeability is moderately rapid or rapid in the Bojac soil. Available water capacity is low. Reaction ranges from extremely acid to medium acid throughout the profile, except where the surface layer has been limed. The seasonal high water table is at a depth of 4 to 6 feet.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, small grain, and soybeans. Leaching of plant nutrients, droughtiness, and the hazard of soil blowing are the main management concerns. Winter cover crops, conservation tillage, and crop residue management help to control erosion and maintain tilth. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water and minimize leaching and soil blowing.

The dominant native trees are loblolly pine, hickory, sweetgum, American beech, southern red oak, and white oak. The understory is mainly dogwood, sassafras, sourwood, and southern waxmyrtle. Few limitations affect woodland management.

The main limitations affecting urban uses are seepage and the instability of cutbanks. Seepage limits most kinds of sanitary facilities. The instability of cutbanks is a limitation in shallow excavations. The soil is a good base for most structures. The sandy surface layer is subject to soil blowing and is droughty when the amount of rainfall is limited.

No major limitations affect recreational uses.

The capability subclass is IIs. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8S.

CfA—Cape Fear silt loam, 0 to 2 percent slopes. This nearly level, very poorly drained soil is dominantly on broad flats in the northern part of the county. Individual areas are irregular in shape. They commonly are 10 to 100 acres in size but range to 500 acres.

Typically, the surface layer is very dark gray silt loam 10 inches thick. The subsoil is 38 inches thick. It is light brownish gray clay loam in the upper part, grayish brown clay in the next part, and gray clay loam and loam in the lower part. The underlying material to a depth of 72 inches is greenish gray and dark greenish gray loam.

Included with this soil in mapping are small areas of Portsmouth, Roanoke, Hyde, and Roper soils. Roper soils are in small depressions. The other included soils are near the outer edge of the mapped areas. Portsmouth, Hyde, and Roper soils have less clay in the subsoil than the Cape Fear soil. Roper soils have an organic surface layer. Roanoke soils are poorly drained. Included soils make up about 10 percent of the map unit.

Permeability is slow to moderately rapid in the Cape Fear soil. Available water capacity is moderate. The shrink-swell potential also is moderate. Reaction ranges from extremely acid to medium acid throughout the profile, except where the surface layer has been limed. The seasonal high water table is within a depth of 1.5 feet.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, small grain, and soybeans.

Wetness is the main limitation. A drainage system is necessary in cultivated areas. A lack of suitable outlets and the restricted permeability limit the installation of a drainage system. Minimum tillage, cover crops, and a cropping system that includes grasses and legumes help to maintain tilth and productivity. Spring tillage and fall harvest may be delayed because of the wetness. Pasture species, such as fescue and ladino clover, are grown on this soil.

The dominant native trees are baldcypress, loblolly pine, red maple, sweetgum, water oak, willow oak, and swamp white oak. The understory is mainly cedar, American holly, sweetbay, sourwood, reeds, and waxmyrtle. Wetness is the main limitation affecting woodland management. A drainage system and bedding of rows help to overcome this limitation. Using standard wheeled and tracked equipment when the soil is wet results in ruts, compacts the soil, and damages the roots of trees. The use of equipment should be limited to the dry periods from midsummer through early fall, when the water table is lowest.

The main limitations affecting urban uses are wetness, the restricted permeability, and low strength. Septic tank absorption fields function poorly because of the wetness and the restricted permeability.

The main limitation affecting recreational uses is wetness. It can be minimized by a drainage system consisting of perforated drain tile, open ditches, or both.

The capability subclass is IIIw in drained areas and VIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 11W.

ChA—Chapanoke silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on low, smooth ridges and flats along small streams that flow into the Pasquotank and North Rivers. Individual areas are irregular in shape and range from 10 to 50 acres in size.

Typically, the surface layer is brown silt loam 6 inches thick. The subsoil is loam 35 inches thick. It is light yellowish brown in the upper part, light gray in the next part, and gray in the lower part. The underlying material is brownish yellow loam in the upper part and light olive gray loamy fine sand in the lower part to a depth of 72 inches.

Included with this soil in mapping are small areas of Perquimans and Yeopim soils. The poorly drained Perquimans soils are in small depressions. The moderately well drained Yeopim soils are on slightly elevated knolls. Also included are small areas of soils that have more clay in the subsoil than is typical for the Chapanoke soil. Included soils make up about 10 percent of the map unit.

Permeability is moderately slow in the Chapanoke soil. Available water capacity is high. Reaction is extremely acid to medium acid throughout the profile, except where the surface layer has been limed. The seasonal high water table is within a depth of 0.5 foot to 1.5 feet.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, small grain, and soybeans. Wetness is the main limitation. A drainage system is necessary to obtain optimum yields. Winter cover crops, conservation tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, northern red oak, red maple, hickory, yellow-poplar, willow oak, and American beech. The understory includes dogwood, sourwood, sweetbay, sassafras, and a variety of briers and reeds. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is wet results in ruts, compacts the soil, and damages the roots of trees.

The main limitation affecting urban and recreational uses is wetness. It can be minimized by a drainage system consisting of perforated drain tile, ditches, or both.

The capability subclass is IIw in drained areas and IIIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9W.

CoA—Chowan silt loam, 0 to 2 percent slopes, frequently flooded. This nearly level, poorly drained soil is on flood plains along small streams that flow into the North and Pasquotank Rivers. Individual areas are oblong and range to 300 acres in size.

Typically, the surface layer is dark gray silt loam 6 inches thick. The underlying material to a depth of 32 inches is gray silty clay loam. Below this, to a depth of 72 inches, is dark reddish brown muck.

Included with this soil in mapping are small areas of Dorovan soils, commonly on the downstream side of the mapped areas. Also included are areas where the overlying mineral material is less than 16 inches thick or more than 40 inches thick. Included soils make up about 10 to 20 percent of the map unit.

Permeability is moderately slow in the mineral horizons of the Chowan soil and moderately rapid to moderately slow in the muck horizon. Available water capacity is high. Reaction ranges from extremely acid to medium acid in the mineral horizons and is extremely acid or very strongly acid in the organic horizon. The

seasonal high water table is within a depth of 0.5 foot. This soil is frequently flooded for very long periods.

Most of the acreage is used as woodland.

This soil is not normally used for agricultural crops. Wetness and the frequent flooding are the main limitations.

The dominant native trees are green ash, baldcypress, sweetgum, Atlantic white cedar, water tupelo, and red maple. The understory is mainly sweetbay, greenbrier, sourwood, and giant cane. Wetness, flooding, and poor trafficability are the main limitations. Harvesting is limited to drier periods, usually in midsummer or early fall.

The main limitations affecting urban and recreational uses are wetness and the frequent flooding.

The capability subclass is VIIw. Based on water tupelo as the indicator species, the woodland ordination symbol is 9W.

DoA—Dorovan muck, 0 to 1 percent slopes, frequently flooded. This nearly level, very poorly drained soil is on the flood plains of Albemarle Sound, the North River, the Pasquotank River, and other major streams. Individual areas are oblong and range from 50 to 300 acres in size.

Typically, the surface layer is dark reddish brown muck 20 inches thick. Below this, to a depth of 80 inches, is black muck.

Included with this soil in mapping are small areas of Chowan soils at the upstream edge of the mapped areas. Also included are areas that have less than 51 inches of muck. Included soils make up about 15 to 20 percent of the map unit.

The Dorovan soil is highly decomposed organic material. Permeability is moderate. Available water capacity is very high. Reaction is extremely acid throughout the profile. The seasonal high water table is 1 foot above the surface to 0.5 foot below. This soil is frequently flooded for very long periods.

Most of the acreage is used as woodland.

The main limitations affecting agricultural uses are wetness and the frequent flooding.

The dominant native species are green ash, baldcypress, blackgum, swamp tupelo, water tupelo, and red maple. The understory is mainly redbay, greenbrier, and waxmyrtle. Wetness, flooding, and poor trafficability are the main limitations affecting woodland management.

The main limitations affecting urban uses are the frequent flooding, excess humus, and low strength.

The main limitations affecting recreational uses are the frequent flooding and excess humus.

The capability subclass is VIIw. Based on blackgum as the indicator species, the woodland ordination symbol is 7W.

HoA—Hobonny muck, 0 to 1 percent slopes, frequently flooded. This nearly level, very poorly drained soil is in areas of marshes along the North River (fig. 3). Individual areas are irregular in shape and range from 10 to 100 acres in size.

Typically, the surface layer is black muck 18 inches thick. Below this, to a depth of 80 inches, is dark reddish brown muck.

Included with this soil in mapping are areas that have less than 51 inches of muck. Also included are areas that have 1 or 2 inches of mineral material covering the surface. Included soils make up about 10 to 15 percent of the map unit.

The surface layer of the Hobonny soil is highly decomposed organic material. Permeability is moderate. Available water capacity is very high. Reaction ranges from extremely acid to strongly acid in the organic layers but is very strongly acid or strongly acid in at least some part of control section. It is very strongly acid to medium acid in the underlying mineral layers, where present. The seasonal high water table ranges from 1 foot above to 0.5 foot below the surface. This soil is frequently flooded by wind tides.

Most of the acreage supports natural vegetation.

This soil is not used for agricultural purposes because of wetness, the frequent flooding, low strength, and landscape position.

This soil is not used for commercial tree production. The dominant native vegetation is black needlerush, big cordgrass, maidencane, eastern baccharis, waxmyrtle, willow, and cattail. Wetness, flooding, and poor trafficability are the main limitations affecting woodland management.

The main limitations affecting urban uses are flooding, wetness, excess humus, and low strength.

The main limitations affecting recreational uses are flooding and excess humus.

The capability subclass is VIIw. This map unit has not been assigned a woodland ordination symbol.

HyA—Hyde silt loam, 0 to 2 percent slopes. This nearly level, very poorly drained soil is on broad flats, mainly in the area of Hales Lake and Belcross. Individual areas are irregular in shape and range from 10 to 300 acres in size.

Typically, the surface layer is black silt loam 11 inches thick. The subsoil is 29 inches thick. It is dark gray silty clay loam in the upper part, dark grayish brown and light brownish gray silt loam and loam in the next part, and light gray clay loam in the lower part. The

Figure 3.—An area of Hobonny muck, 0 to 1 percent slopes, frequently flooded, in a marsh along the North River.

underlying material to a depth of 72 inches is gray fine sandy loam.

Included with this soil in mapping are small areas of Portsmouth, Cape Fear, and Roper soils. These soils are in scattered areas throughout the unit. Portsmouth soils have less silt and more sand than the Hyde soil, Cape Fear soils have more clay in the subsoil, and Roper soils have an organic surface layer. Included soils make up about 10 percent of the map unit.

Permeability is moderately slow in the Hyde soil. Available water capacity is high. Reaction ranges from extremely acid to strongly acid in the upper part of the soil and from extremely acid to neutral in the lower part. The seasonal high water table is within a depth of 1.5 feet.

Most of the acreage is used as cropland (fig. 4). The rest is used mainly as woodland.

The major crops are corn, small grain, and soybeans. Wetness is the main limitation affecting crop production. A drainage system is necessary in cultivated areas. A lack of suitable outlets limits the installation of a drainage system. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes help to maintain tilth and productivity. Tillage may be delayed in spring because of the wetness.

The dominant trees are loblolly pine, water tupelo, baldcypress, red maple, green ash, sweetgum, swamp tupelo, yellow-poplar, water oak, and willow oak. The understory is mainly American holly, sweetbay, sourwood, reeds, and waxmyrtle. Wetness is the main limitation affecting woodland management. A drainage system and bedding help to overcome this limitation. Using standard wheeled and tracked equipment when the soil is wet results in ruts, compacts the soil, and damages the roots of trees. The use of equipment

should be limited to the dry periods from midsummer through early fall, when the water table is lowest.

The main limitation affecting urban and recreational uses is wetness. It can be minimized by a drainage system consisting of perforated drain tile, ditches, or both. Depth to the seasonal high water table should be considered when septic tank absorption fields are designed.

The capability subclass is IIIw in drained areas and Vw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10W.

MuA—Munden loamy sand, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on smooth, low ridges. Individual areas are irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 9 inches thick. The subsoil is sandy loam 28 inches thick. It is yellowish brown in the upper part, brownish yellow in the next part, and light brownish gray in the lower part. The underlying material to a depth of 72 inches is sand. It is yellow in the upper part and light gray in the lower part.

Included with this soil in mapping are small areas of Bojac, Nimmo, and Altavista soils. The well drained Bojac soils are on slightly elevated ridges. The poorly drained Nimmo soils are in slight depressions. Altavista soils have more clay in the subsoil than the Munden soil and are in scattered areas throughout the unit. Included soils make up about 10 to 15 percent of the map unit.

Permeability is moderate or moderately rapid in the subsoil of the Munden soil and rapid in the underlying material. Available water capacity is low or moderate.

Figure 4.—An area of Hyde silt loam, 0 to 2 percent slopes, used for corn.

Reaction ranges from very strongly acid to medium acid, except where the surface layer has been limed. The seasonal high water table is at a depth of 1.5 to 2.5 feet.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn and soybeans. Wetness is the main limitation. Winter cover crops, conservation tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, white oak, water oak, and American beech. The major understory species are dogwood, sourwood, sweetbay, sassafras, and a variety of briers and reeds. Wetness is the main limitation. Using standard wheeled and tracked equipment when the soil is wet compacts the soil and damages the roots of trees.

The main limitation affecting urban and recreational uses is wetness. It can be minimized by a drainage system consisting of perforated drain tile, ditches, or both. Depth to the seasonal high water table should be considered when septic tank absorption fields are designed.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9W.

NoA—Nimmo sandy loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on low, smooth ridges and in depressions. Individual areas are irregular in shape and range from 5 to 60 acres in size.

Typically, the surface layer is dark grayish brown sandy loam 7 inches thick. The subsoil is 45 inches thick. It is light brownish gray sandy loam in the upper part and grayish brown loamy sand in the lower part. The underlying material to a depth of 72 inches is light gray sand.

Included with this soil in mapping are small areas of Augusta and Tomotley soils. The somewhat poorly drained Augusta soils are on slightly elevated ridges. Tomotley soils have more clay in the subsoil than the Nimmo soil and are in scattered areas throughout the unit. Included soils make up about 10 to 15 percent of the map unit.

Permeability is moderate in the subsoil of the Nimmo soil and moderately rapid in the underlying material. Available water capacity is low or moderate. Reaction ranges from extremely acid to strongly acid. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is cultivated. The rest is used mainly as woodland.

This soil is well suited to most locally grown crops. The major crops are corn, potatoes, small grain, and soybeans. Wetness is the main limitation. A drainage system is necessary in cultivated areas. Winter cover crops, conservation tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, willow oak, white oak, and water oak. The understory includes dogwood, sourwood, sweetbay, sassafras, and a variety of briers and reeds. Wetness is the main limitation. A drainage system improves tree growth, facilitates the use of equipment, and reduces the extent of the soil damage caused by forestry activities.

The main limitation affecting urban and recreational uses is wetness. It can be minimized by a drainage system consisting of perforated drain tile, ditches, or both. Depth to the seasonal high water table should be considered when septic tank absorption fields are designed.

The capability subclass is IIIw in drained areas and IVw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10W.

PeA—Perquimans silt loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on broad flats. Individual areas are irregular in shape and range from 10 to 500 acres in size.

Typically, the surface layer is dark grayish brown silt loam 8 inches thick. The subsoil is 57 inches thick. It is light gray silt loam in the upper part, light brownish gray and light gray loam in the next part, and gray sandy clay loam in the lower part. The underlying material to a depth of 72 inches is grayish brown fine sandy loam.

Included with this soil in mapping are small areas of Roanoke and Tomotley soils. These soils are in scattered areas throughout the unit. Roanoke soils have more clay in the subsoil than the Perquimans soil, and Tomotley soils have more sand and less silt in the subsoil. Also included are small areas of soils that have less clay in the subsoil than is typical for Perquimans soils. They are in the area of Belcross. Included soils make up about 10 to 15 percent of the map unit.

Permeability is moderately slow in the Perquimans soil. Available water capacity is high. Reaction ranges from very strongly acid to medium acid, except where the surface layer has been limed. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, potatoes, cabbage, and

soybeans. Wetness is the main limitation. A drainage system is necessary in cultivated areas. Winter cover crops, conservation tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, green ash, yellow-poplar, willow oak, and water oak. The major understory species are dogwood, sourwood, sweetbay, sassafras, and a variety of briers and reeds. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is wet results in ruts, compacts the soil, and damages the roots of trees. A drainage system improves tree growth, facilitates the use of equipment, and reduces the extent of the soil damage caused by forestry activities.

The main limitation affecting urban and recreational uses is wetness. It can be minimized by a drainage system consisting of perforated drain tile, ditches, or both. Depth to the seasonal high water table should be considered when septic tank absorption fields are designed.

The capability subclass is IIIw in drained areas and VIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10W.

PtA—Portsmouth fine sandy loam, 0 to 2 percent slopes. This nearly level, very poorly drained soil is on broad flats and in depressions. Individual areas are irregular in shape and range from 10 to 300 acres in size.

Typically, the surface layer is black fine sandy loam 11 inches thick. The subsoil is grayish brown sandy clay loam 18 inches thick. The underlying material to a depth of 65 inches is light gray sand.

Included with this soil in mapping are small areas of Roper, Cape Fear, and Hyde soils. These soils are generally near the outer edge of the mapped areas. Cape Fear soils have more clay in the subsoil than the Portsmouth soil, Hyde soils have more silt in the subsoil, and Roper soils have an organic surface layer. Included soils make up about 10 to 15 percent of the map unit.

Permeability is moderate in the upper part of the Portsmouth soil and rapid in the underlying material. Available water capacity is low. Reaction ranges from extremely acid to strongly acid throughout the surface layer and the subsoil, except where the surface layer has been limed. The underlying material ranges from extremely acid to medium acid. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is cultivated. The rest is used mainly as woodland.

If drained, this soil can support most locally grown crops. The major crops are corn, small grain, potatoes, and soybeans (fig. 5). Wetness is the main limitation. A drainage system is necessary in cultivated areas. Minimum tillage, cover crops, and a cropping system that includes grasses and legumes help to maintain tilth and productivity. Tillage may be delayed in spring because of the wetness. A lack of suitable outlets limits the installation of a drainage system.

The dominant trees are loblolly pine, red maple, green ash, sweetgum, yellow-poplar, water oak, and willow oak. The understory is mainly Atlantic white cedar, American holly, sweetbay, redbay, reeds, and waxmyrtle. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is wet results in ruts, compacts the soil, and damages the roots of trees. A drainage system improves tree growth, facilitates the use of equipment, and reduces the extent of the soil damage caused by forestry activities.

The main limitation affecting urban uses is wetness. A drainage system can help to overcome this limitation. A lack of suitable outlets limits the installation of a drainage system. Seepage is a limitation affecting most sanitary facilities. The instability of cutbanks is a limitation affecting shallow excavations.

The main limitation affecting recreational uses is wetness. A lack of suitable outlets limits the installation of a drainage system.

The capability subclass is IIIw in drained areas and VIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 11W.

PuA—Pungo muck, 0 to 2 percent slopes. This nearly level, very poorly drained soil is dominantly on broad flats in the northern part of the county in the Great Dismal Swamp. Individual areas are irregular in shape and range to several thousand acres in size.

Typically, the muck is 97 inches thick. It is black in the upper part, dark reddish brown in the next part, and black in the lower part. The underlying material to a depth of 99 inches is gray loam.

Included with this soil in mapping are small areas of Dorovan and Belhaven soils. Dorovan soils are frequently flooded and are at the outer edge of the mapped areas. Belhaven soils have less than 51 inches of muck and are in scattered areas throughout the unit. Included soils make up about 10 percent of the map unit.

The surface layer of the Pungo soil is highly decomposed organic material. Permeability is slow.

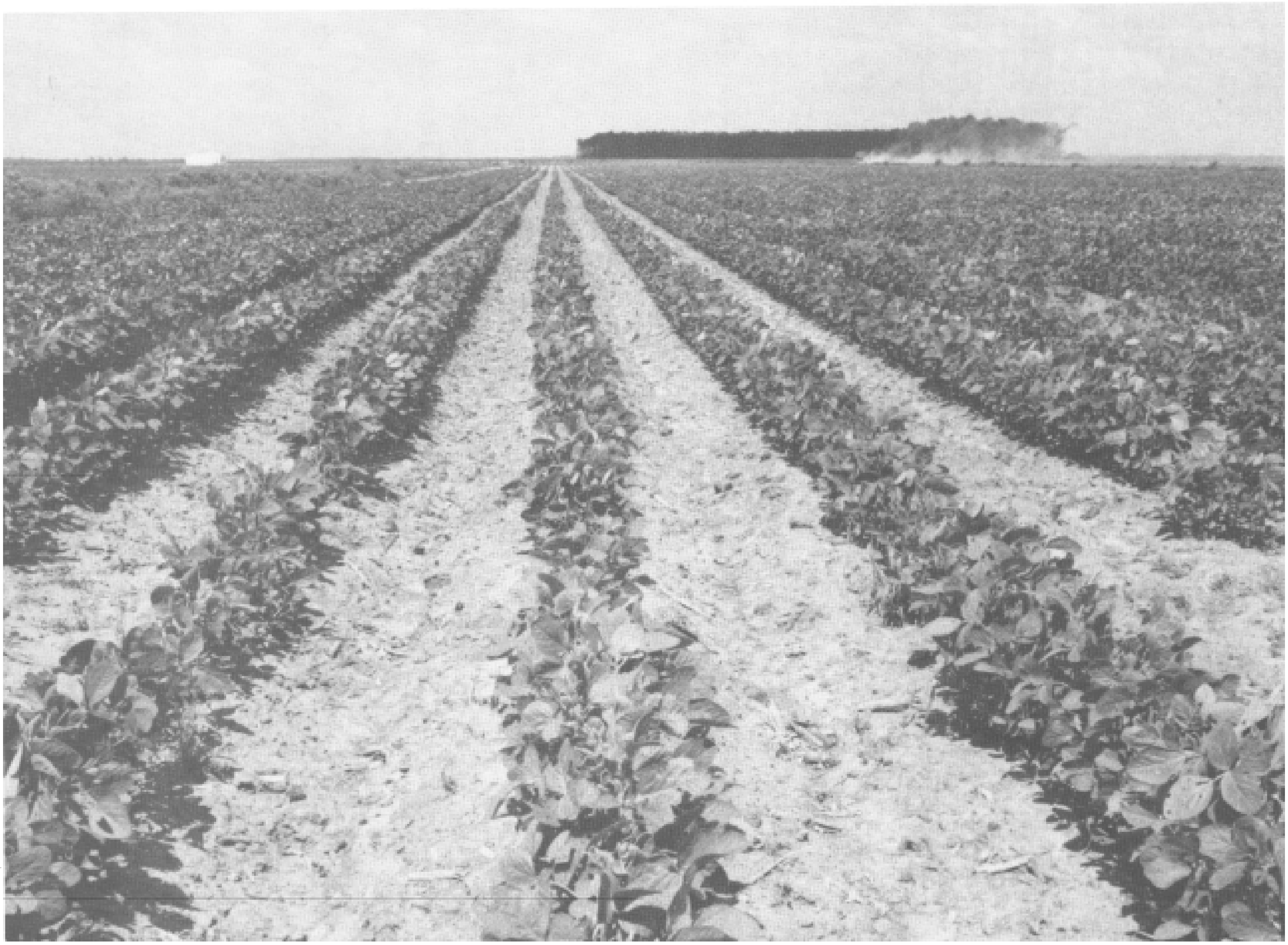

Figure 5.—Soybeans in an area of Portsmouth fine sandy loam, 0 to 2 percent slopes.

Available water capacity is very high. The shrink-swell potential is moderate in the underlying material. The soil is extremely acid in the organic layers, except where the surface layer has been limed. The underlying mineral layers range from extremely acid to strongly acid. Large logs, roots, and stumps are throughout the organic horizons. The seasonal high water table is within a depth of 1 foot in undrained areas.

Most of the acreage is used as woodland.

The main limitations affecting agricultural uses are wetness; the high content of logs, stumps, and roots; and the thickness of the muck layers. The logs, stumps, and roots need to be removed before equipment can be operated (fig. 6). The colloidal, pastelike consistency of some of the organic layers is a limitation. If these horizons are "over-drained" or otherwise dried, they can harden irreversibly, restricting root penetration and water movement. Installing an effective drainage system is very difficult. Tile drains are ineffective because of the slow lateral movement of water through the muck.

The dominant native trees are pond pine, Atlantic white cedar, red maple, baldcypress, and sweetbay. The understory is mainly bitter galdberry, fetterbush lyonia, greenbrier, and sweet pepperbush. Wetness and low strength are the main limitations affecting woodland management. The soil has a poor load-supporting capacity. Use of low-pressure ground equipment reduces the extent of the damage to the soil. The use of equipment should be limited to the dry periods from midsummer through early fall, when the water table is lowest (fig. 7).

The main limitations affecting urban uses are

wetness, excess humus, seepage, and low strength. A drainage system can help to overcome the wetness. Pilings help to overcome low strength.

The main limitations affecting recreational uses are wetness and excess humus. A drainage system can help to overcome the wetness.

The capability subclass is IVw in drained areas and VIIw in undrained areas. Based on pond pine as the indicator species, the woodland ordination symbol is 2W.

RoA—Roanoke silt loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on broad flats and in slight depressions. Individual areas range from 10 to more than 300 acres in size.

Typically, the surface layer is grayish brown silt loam 6 inches thick. The subsurface layer is grayish brown silt loam. The subsoil is 41 inches thick. It is gray and light gray clay and clay loam in the upper part and grayish brown silt loam in the lower part. The underlying material to a depth of 72 inches is loam. It is gray in the upper part and dark gray in the lower part.

Included with this soil in mapping are small areas of Cape Fear, Perquimans, and Tomotley soils. The very poorly drained Cape Fear soils are in small depressions. Perquimans and Tomotley soils have less clay in the subsoil than the Roanoke soil and are near the outer edge of the mapped areas. Included soils make up about 10 percent of the map unit.

The content of organic matter in the surface layer of the Roanoke soil is medium. Permeability is slow. Available water capacity is moderate. The shrink-swell potential also is moderate. The soil is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is cultivated. The rest is used mainly as woodland.

Figure 6.—Logs, stumps, and roots in an area of Pungo muck, 0 to 2 percent slopes.

Figure 7.—A wooded area of Pungo muck, 0 to 2 percent slopes, which has a seasonal high water table at or near the surface during winter and spring.

The major crops are corn, small grain, and soybeans. Wetness is the main limitation in cultivated areas. A drainage system is necessary in cultivated areas. A lack of suitable outlets and the slow permeability limit the installation of a drainage system. Minimum tillage, cover crops, and a cropping system that includes grasses and legumes can help to maintain tilth and productivity. Tillage may be delayed in spring because of the wetness.

The dominant native trees are red maple, yellow-poplar, sweetgum, loblolly pine, southern red oak, green ash, and water oak. The understory is mainly sourwood, reeds, and waxmyrtle. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is wet results in ruts, compacts the soil, and damages roots. A drainage system improves tree growth, facilitates the use of equipment, and reduces the extent of the soil damage caused by forestry activities.

The main limitations affecting urban uses are wetness and the slow permeability.

The main limitation affecting recreational uses is wetness. It can be minimized by a drainage system.

The capability subclass is IIIw in drained areas and

IVw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9W.

RpA—Roper muck, 0 to 2 percent slopes. This nearly level, very poorly drained soil is dominantly on broad flats in the area of Hales Lake. Individual areas are irregular in shape and range from 10 to 300 acres in size.

Typically, the surface layer is black muck 11 inches thick. Mineral material underlies the muck. The upper 6 inches of this material is very dark grayish brown mucky loam. Next is very dark gray and dark gray loam to a depth of 41 inches. Below this, the underlying material is greenish gray sandy clay loam in the upper part, grayish green sandy clay loam in the next part, and dark greenish gray sandy loam in the lower part to a depth of 72 inches.

Included with this soil in mapping are small areas of Wasda, Hyde, and Belhaven soils. These soils are in scattered areas throughout the unit. Wasda soils have more sand and less silt in the subsoil than the Roper soil. Hyde soils do not have an organic surface layer. Belhaven soils are organic to a depth of more than 16 inches. Included soils make up about 15 percent of the map unit.

The surface layers of the Roper soil are highly decomposed organic material. Permeability is moderately slow. Available water capacity is high. Reaction ranges from extremely acid to strongly acid in the upper part of the soil and from extremely acid to mildly alkaline in the lower part. The seasonal high water table is within a depth of 1.5 feet.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, small grain, potatoes, and soybeans. Wetness is the main limitation affecting cultivation. A drainage system is necessary in cultivated areas. Spring tillage and fall harvest may be delayed because of the wetness. Large applications of lime are necessary to prepare the soil for crop production. During spring planting, soil blowing is a hazard. It can be minimized by conservation tillage, field borders, and windbreaks.

The dominant native species are red maple, pond pine, baldcypress, blackgum, yellow-poplar, loblolly pine, and sweetgum. The understory species are mainly swamp cyrilla, waxmyrtle, fetterbush lyonia, and switchcane. Wetness is the main limitation affecting woodland management. A drainage system and bedding of rows improve tree growth, facilitate the use of equipment, and reduce the extent of the soil damage caused by forestry activities.

The main limitations affecting urban and recreational uses are wetness and a high content of organic matter.

The capability subclass is IIIw in drained areas and VIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8W.

SeA—Seabrook fine sand, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on low ridges and flats along small streams and rivers that flow into Albemarle Sound and the Pasquotank River. Individual areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is dark brown fine sand 7 inches thick. The underlying material to a depth of 74 inches is fine sand and sand. It is brownish yellow and very pale brown in the upper part, light brownish gray in the next part, and light gray in the lower part.

Included with this soil in mapping are small areas of Nimmo, Munden, and Bojac soils. These soils have more clay in the subsoil than the Seabrook soil. The poorly drained Nimmo soils are in slight depressions. The well drained Bojac soils and the Munden soils are near the outer edge of the mapped areas. Also included are small areas of similar soils that are well drained. These soils are generally on slightly elevated ridges. Included soils make up about 10 percent of the map unit.

Permeability is rapid in the Seabrook soil. Available water capacity is very low. Reaction ranges from very strongly acid to slightly acid, except where the surface layer has been limed. The seasonal high water table is within a depth of 2 to 4 feet.

Most of the acreage is used as woodland. The rest is mainly cultivated.

The major crops are corn, small grain, and soybeans. Wetness and soil blowing are the main limitations. Winter cover crops, conservation tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, willow oak, water oak, and American beech. The understory includes dogwood, sourwood, sweetbay, sassafras, and a variety of briers and reeds. The main limitation affecting woodland management is the sandy texture of the surface and subsurface layers.

The main limitations affecting urban uses are wetness, the instability of cutbanks, and seepage. The wetness can be minimized by a drainage system consisting of perforated drain tile, ditches, or both. Because of the hazard of cutbanks caving, excavations should have sloped banks or temporary retaining walls.

The main limitation affecting recreational uses is the fine sand texture of the surface layer.

The capability subclass is IIIs. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8S.

StA—State fine sandy loam, 0 to 2 percent slopes. This nearly level, well drained soil is on low ridges near small streams that flow into Albemarle Sound, the North River, and the Pasquotank River. Individual areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is dark brown fine sandy loam 8 inches thick. The subsoil is 34 inches thick. It is strong brown sandy clay loam in the upper part, yellowish brown sandy clay loam in the next part, and brownish yellow sandy loam in the lower part. The underlying material is gray sandy loam in the upper part and light olive brown sand in the lower part to a depth of 72 inches.

Included with this soil in mapping are small areas of Altavista and Bojac soils. The moderately well drained Altavista soils are in shallow depressions. Bojac soils have less clay in the subsoil than the State soil and are in scattered areas throughout the unit. Included soils make up about 10 to 15 percent of the map unit.

Permeability is moderate in subsoil of the State soil and moderately rapid in underlying layers. Available water capacity is moderate. Reaction is extremely acid to strongly acid in the surface layer and the upper part of the subsoil and extremely acid to slightly acid in the lower part of the subsoil and in the underlying material. The seasonal high water table is at a depth of 3 to 5 feet.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, soybeans, and small grain. Winter cover crops, conservation tillage, and crop residue management help to control runoff and erosion and maintain tilth.

The dominant native trees are loblolly pine, red maple, hickory, yellow-poplar, American beech, southern red oak, and white oak. The understory is mainly dogwood, sassafras, sourwood, and waxmyrtle. No major limitations affect woodland management.

No limitations affect most urban and recreational uses.

The capability class is I. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

StB—State fine sandy loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on slightly rounded ridges near streams that flow into Albemarle Sound, the North River, and the Pasquotank River. Individual areas are irregular in shape and range from 5 to 35 acres in size.

Typically, the surface layer is dark brown fine sandy loam 8 inches thick. The subsoil is 34 inches thick. It is strong brown sandy clay loam in the upper part, yellowish brown sandy clay loam in the next part, and brownish yellow sandy loam in the lower part. The underlying material is gray sandy loam in the upper part and light olive brown sand in the lower part to a depth of 72 inches.

Included with this soil in mapping are small areas of Altavista and Bojac soils. The moderately well drained Altavista soils are in shallow depressions. Bojac soils have less clay in the subsoil than the State soil and are in scattered areas throughout the map unit. Also included are soils that have a slope of more than 6 percent. They are along the edge of small streams. Included soils make up about 15 percent of the map unit.

Permeability is moderate in the subsoil of the State soil and moderately rapid in the underlying layers. Available water capacity is moderate. The soil is extremely acid or strongly acid in the surface layer and the upper part of the subsoil and extremely acid to slightly acid in the lower part of the subsoil and in the underlying material. The seasonal high water table is at a depth of 3 to 5 feet.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, soybeans, and small grain. The hazard of erosion is the main management concern. Winter cover crops, conservation tillage, and crop residue management help to control runoff and erosion and maintain tilth. No-till planting, field borders, and crop rotations that include close-growing crops also conserve soil and water. This soil is well suited to pasture species.

The dominant native trees are loblolly pine, red maple, hickory, yellow-poplar, American beech, southern red oak, and white oak. The understory is mainly dogwood, sassafras, sourwood, and waxmyrtle.

No major limitations affect most urban and recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

ToA—Tomotley fine sandy loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on flats and in slight depressions. Individual areas are irregular in shape and range from 10 to 50 acres in size.

Typically, the surface layer is dark grayish brown fine

sandy loam 8 inches thick. The subsoil is 35 inches thick. It is grayish brown sandy clay loam in the upper part, gray sandy clay loam in the next part, and grayish brown and light brownish gray sandy clay loam and sandy loam in the lower part. The underlying material to a depth of 60 inches is gray loamy sand.

Included with this soil in mapping are small areas of Augusta, Nimmo, Portsmouth, and Roanoke soils. The somewhat poorly drained Augusta soils are on slightly elevated ridges. The very poorly drained Portsmouth soils are in depressions. Nimmo and Roanoke soils are in scattered areas throughout the unit. Nimmo soils have less clay in the subsoil than the Tomotley soil, and Roanoke soils have more clay in the subsoil. Included soils make up about 10 percent of the map unit.

Permeability is moderate or moderately slow in subsoil of the Tomotley soil and moderately rapid in the underlying layers. Available water capacity is moderate. Reaction ranges from extremely acid to strongly acid to a depth of about 43 inches. Below this depth, it ranges from extremely acid to medium acid. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, soybeans, potatoes, and small grain. Wetness is the main limitation in cultivated areas. A drainage system is necessary to obtain optimum yields. Winter cover crops, conservation tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, willow oak, and water oak. The understory is mainly dogwood, sourwood, sweetbay, sassafras, and a variety of briers and reeds. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is wet results in ruts, compacts the soil, and damages the roots of trees. A drainage system improves tree growth, facilitates the use of equipment, and reduces the extent of the soil damage caused by forestry activities.

The main limitation affecting urban and recreational uses is wetness. It can be minimized by a drainage system consisting of perforated drain tile, ditches, or both. Depth to the seasonal high water table should be considered when septic tank absorption fields are designed.

The capability subclass is IIIw in drained areas and IVw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10W.

Ud—Udorthents, loamy. This map unit consists of excavated areas where the natural soil has either been destroyed or covered by grading and digging. Dredge and fill areas and areas of landfill are in this unit. Each type of area is identified on the soil map. The areas are mapped as a single map unit because they generally have a loamy texture and are capable of supporting plants.

Dredge and fill areas are commonly near built-up areas along the Intracoastal Waterway, Albemarle Sound, and the edge of the major river systems. Typically, dredge material is used to construct fill areas along the water's edge, improving the site for more intensive uses. Building sites are one such use. In some areas borrow material from upland areas has been used to improve the quality of low, wet sites.

Landfills are areas where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered with a thin layer of soil. When the trench is full, it is covered by a final cover of soil material.

Onsite investigation is needed before the use and management of specific areas are planned.

The capability subclass is VIIe. This map unit has not been assigned a woodland ordination symbol.

WdA—Wasda muck, 0 to 2 percent slopes. This nearly level, very poorly drained soil is dominantly on broad flats in the area of Hales Lake. Individual areas are irregular in shape and range from 10 to 200 acres in size.

Typically, the surface layer is black and dark reddish brown muck 14 inches thick (fig. 8). Mineral material underlies the muck. The upper 6 inches of this material is very dark grayish brown mucky loam. Next is sandy clay loam to a depth of 43 inches. It is dark grayish brown in the upper part and grayish brown in the lower part. Below this, the underlying material to a depth of 72 inches is gray loam and sand.

Included with this soil in mapping are small areas of Roper, Portsmouth, Hyde, and Belhaven soils. These soils are in scattered areas throughout the unit. Roper soils have more silt in the mineral horizons than the Wasda soil. Portsmouth and Hyde soils do not have an organic surface horizon. Belhaven soils are organic to a depth of more than 16 inches thick. Included soils make up about 15 percent of the map unit.

Permeability is moderate in subsoil of the Wasda soil and rapid in the underlying layers. Available water capacity is high. The soil is extremely acid to strongly acid in the upper part of the control section and strongly acid to mildly alkaline in the lower part and in the C horizon. The seasonal high water table is within a depth of 1 foot.

Figure 8.—A drainage ditch in an area of Wasda muck, 0 to 2 percent slopes, which has a dark surface layer of muck. This layer is underlain by light colored mineral layers.

Most of the acreage is cultivated. The rest is used mainly as woodland.

The major crops are corn, small grain, potatoes, and soybeans. Wetness is the main limitation affecting cultivation. Spring tillage and fall harvest may be delayed because of the wetness. Large applications of lime are necessary to prepare the soil for crop production. During spring planting, soil blowing is a hazard. It can be minimized by conservation tillage, field borders, and windbreaks.

The dominant native species are red maple, sweetbay, baldcypress, blackgum, loblolly pine, water tupelo, water oak, swamp tupelo, and sweetgum. The understory is mainly swamp cyrilla, waxmyrtle, pawpaw, fetterbush lyonia, and switchcane. Wetness is the main limitation affecting woodland management. A drainage

system and bedding of rows improve tree growth, facilitate the use of equipment, and reduce the extent of the soil damage caused by forestry activities.

The main limitations affecting urban and recreational uses are wetness and excess humus.

The capability subclass is IIIw in drained areas and VIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8W.

YeA—Yeopim silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is near small streams and rivers that flow into Albemarle Sound, the North River, and the Pasquotank River. Individual areas are irregular in shape and range from 10 to 50 acres in size.

Typically, the surface layer is dark grayish brown silt loam 7 inches thick. The subsoil is 35 inches thick. It is yellowish brown silt loam in the upper part, light yellowish brown silty clay loam in the next part, and light yellowish brown loam in the lower part. The underlying material to a depth of 72 inches is fine sandy loam. It is light gray in the upper part and light yellowish brown in the lower part.

Included with this soil in mapping are small areas of Chapanoke and Altavista soils. The somewhat poorly

Figure 9.—An area of Yeopim silt loam, 0 to 2 percent slopes, used for wheat.

drained Chapanoke soils are in small depressions. Altavista soils have less silt in the subsoil than the Yeopim soil and are near the outer edge of the mapped areas. Included soils make up about 10 percent of the map unit.

Permeability is moderately slow in the subsoil of the Yeopim soil and moderate or moderately rapid in underlying layers. Available water capacity is high. Reaction is extremely acid to medium acid throughout the profile, except where the surface layer has been limed. The seasonal high water table is at a depth of 1.5 to 3.0 feet.

Most of the acreage is cultivated (fig. 9). The rest is used mainly as woodland.

The major crops are corn, small grain, and soybeans. Seasonal wetness is the main limitation. Winter cover crops, conservation tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and crop rotations that include close-growing crops conserve soil and water.

The dominant native trees are yellow-poplar, sweetgum, red maple, American beech, white oak, southern red oak, and loblolly pine. The understory is mainly dogwood, sweetbay, sourwood, American holly, waxmyrtle, and sassafras. The main limitation affecting woodland management is the seasonal high water table, which may restrict the use of equipment during winter months.

The main limitation affecting urban and recreational uses is wetness. It can be minimized by a drainage system consisting of perforated drain tile, ditches, or both. The wetness should be considered when septic tank absorption fields are designed.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

Prime Farmland

In this section, prime farmland is defined and the soils in Camden County that are considered prime farmland are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. The moisture supply must be adequate, and the growing season must be sufficiently long. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 8 percent.

The following map units are considered prime farmland in Camden County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Some soils that have a high water table qualify as prime farmland only in areas where this limitation has been overcome by drainage measures. If applicable, the need for these measures is indicated in parentheses after the map unit name in the following list. Onsite evaluation is necessary to determine whether or not the limitation has been overcome by corrective measures.

The soils identified as prime farmland in Camden County are:

AaA	Altavista fine sandy loam, 0 to 2 percent slopes
AtA	Augusta fine sandy loam, 0 to 2 percent slopes (where drained)
ChA	Chapanoke silt loam, 0 to 2 percent slopes (where drained)
HyA	Hyde silt loam, 0 to 2 percent slopes (where drained)
NoA	Nimmo sandy loam, 0 to 2 percent slopes (where drained)
PeA	Perquimans silt loam, 0 to 2 percent slopes (where drained)
PtA	Portsmouth fine sandy loam, 0 to 2 percent slopes (where drained)
RpA	Roper muck, 0 to 2 percent slopes (where drained)
StA	State fine sandy loam, 0 to 2 percent slopes

StB State fine sandy loam, 2 to 6 percent slopes

ToA Tomotley fine sandy loam, 0 to 2 percent slopes (where drained)

WdA Wasda muck, 0 to 2 percent slopes (where drained)

YeA Yeopim silt loam, 0 to 2 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Generally, the soils in Camden County that are well suited to crops also are well suited to urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Bobby G. Brock, conservation agronomist, and Dwane Hinson, district conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

In 1987, Camden County had 49,683 acres of farmland. About 45,111 acres, or 30 percent of the total land area of the county, was used as cropland *(13)*.

The major crops include corn, soybeans, potatoes, cabbage, and small grain.

Corn, soybeans, and small grain are the most common crops in areas of the somewhat poorly drained, moderately well drained, and well drained, nearly level and gently sloping Altavista, Bojac, Munden, Augusta, State, Seabrook, Yeopim, and Chapanoke soils. Cabbage is grown in some areas of Chapanoke, Yeopim, and Augusta soils. A drainage system is needed in some areas of Altavista, Munden, Augusta, Seabrook, Yeopim, and Chapanoke soils. Soil blowing is a hazard in areas of Bojac, Munden, and Seabrook soils unless a cover of mulch is maintained or the surface is roughened by proper tillage.

Corn, soybeans, potatoes, and cabbage are the most common crops in areas of the poorly drained soils, such

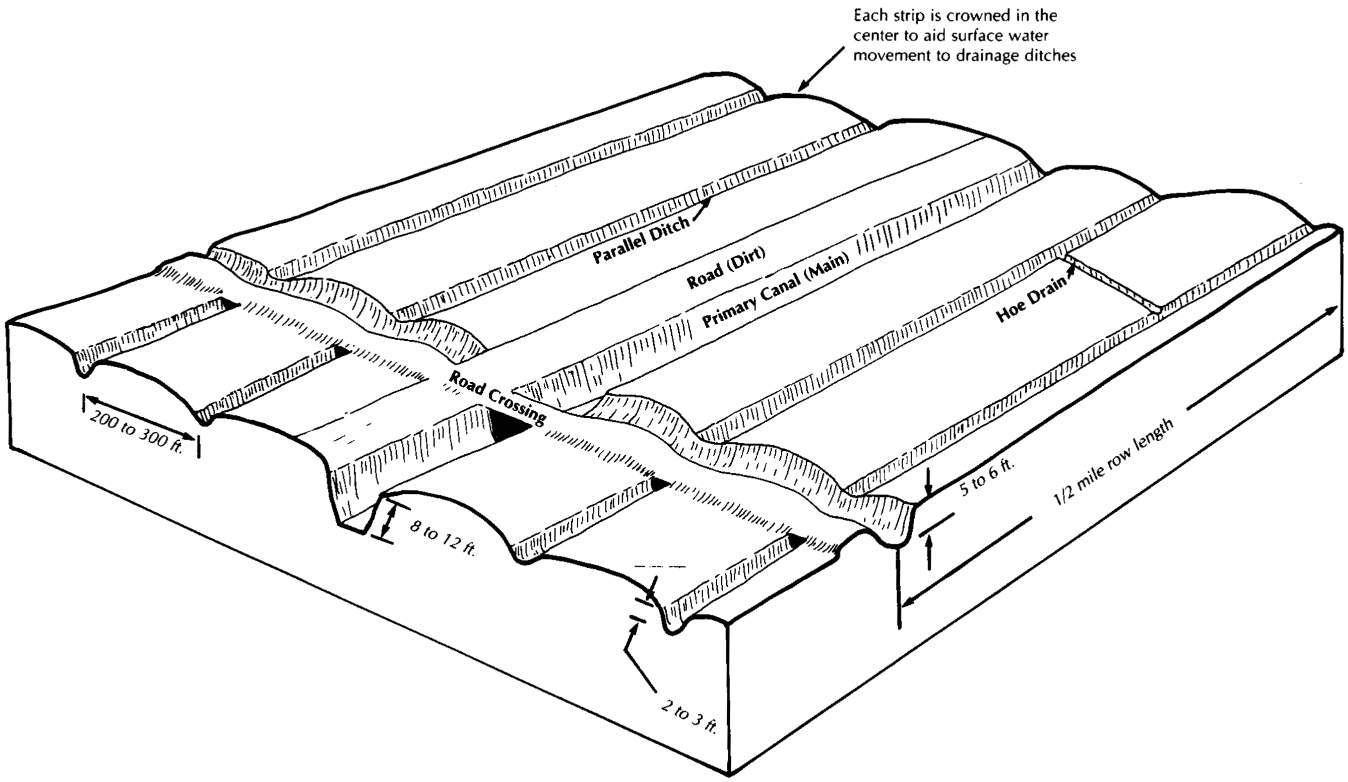

Figure 10.—The drainage systems commonly used in Camden County.

as Tomotley, Perquimans, Nimmo, and Roanoke soils. Potatoes, however, are not commonly grown in areas of Roanoke soils because of a high content of clay in the soil. A drainage system is needed for optimum crop production in areas of the poorly drained soils. Draining areas of these soils for use as cropland requires a primary system of canals, a secondary system of field ditches, and surface shaping and leveling. Field ditches are generally 200 to 400 feet apart.

Corn, soybeans, and small grain are the most common crops in areas of the very poorly drained soils. These soils can be divided in three groups. The first group consists of mineral soils, such as Hyde, Portsmouth, and Cape Fear soils. The second group consists of soils that have an organic surface layer and a mineral subsoil. Examples are Wasda and Roper soils. The third group consists of organic soils, such as Belhaven, Pungo, and Dorovan soils. Dorovan soils have not been developed for farming. They are in wet, wooded swamps.

Practices applicable to farming very poorly drained soils are described in the following paragraphs. Onsite evaluation should be made to determine if a particular practice is ecologically desirable.

Very poorly drained soils require an extensive drainage system to provide at least a minimum of aeration in the upper part of the profile for plant roots. Draining areas of the very poorly drained soils for use as cropland requires a primary system of canals, a secondary system of field ditches, and surface shaping and leveling (fig. 10). Surface drains are necessary to remove much of the excess water. A workable surface drainage system includes a surface that has a slope of less than 1 percent from the ditch to the center of the field. Smoothing the fields removes depressional areas that pocket excess surface water.

Water-control structures are used to control the depth to a water table. They are designed so that water can be removed after large storms or retained for use during periods of drought (fig. 11).

Surface runoff from high-intensity rains may cause soil loss, even on fields that are nearly level. Most of the runoff occurs in and around "hoe drains," or drains that cross fields from ditch to ditch. The bulk of the eroded soil settles in field ditches and canals, closing outlets and causing the need to frequently clean out the drainage system. The hazard of erosion can be reduced by shaping and leveling the field, reducing the number

of cross drains, minimizing tillage, leaving crop residue on the surface, and establishing a plant cover to stabilize ditch and canal banks.

Soil blowing is a hazard if the soils are bare, do not have a rough surface, and have a dry surface layer. It is most likely in areas of soils that have a high content of organic matter and a loose, very friable surface layer. In some areas windblown soil can partially fill ditches and canals, reducing their effectiveness. Leaving crop residue on the surface and using no-till planting are the most effective methods for controlling soil blowing on cropland.

Windbreaks help control soil blowing and minimize damage to young, tender plants. To be most effective, they should be perpendicular to the wind. The effective area of control is generally ten times as long as the

Figure 11.—A water-control structure in an area of Roper muck, 0 to 2 percent slopes.

height of the windbreak. Windbreaks provide good wildlife habitat and add to the beauty of large, cleared areas.

All of the very poorly drained soils in the county have a high lime requirement because they have a high content of organic matter. In their natural state, they are extremely acid. Lime should be applied according to the results of soil tests. Generally, 1 ton of lime per acre is required every 2 to 3 years.

Chemical Weed Control

The use of herbicides for weed control is a common practice on the cropland in Camden County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates of both of these properties were determined for the soils in the county. Table 14 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 13.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received high amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the content of organic matter in the surface layer. A lower content of organic matter is common where the surface layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter content determinations.

Soil Fertility

The soils in Camden County generally are low in natural fertility. They are naturally acid. Additions of lime and fertilizer are needed for the production of most kinds of crops.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects of high levels of aluminum on many crops. Liming adds calcium (from calcitic lime) or calcium and magnesium (from dolomitic lime) to the soil.

A soil test is a guide to what amount and kind of lime should be used. The desired pH levels may differ, depending on the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required, however, for peanuts and clover, in some rotations of soybeans, or for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can indicate the need for phosphorus and potassium fertilizer. They are needed because phosphorus and potassium tend to build up in the soil.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by the crop is an unnecessary expense and causes a hazard of water pollution. If corn or cotton is grown after the harvest of soybeans, nitrogen rates can be reduced by about 20 to 30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops

grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the North Carolina Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland *(10)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w, s,* or *c.*

The capability classification of each map unit component is given in the section "Detailed Soil Map Units" and in table 5.

Woodland Management and Productivity

Albert Coffey, forester, Natural Resources Conservation Service, helped prepare this section.

Owners of woodland in Camden County have many objectives. These objectives include producing timber; conserving wildlife, soil, and water; preserving esthetic values; and providing opportunities for recreational activities, such as commercial hunting. Public demand for clean water and for recreational areas creates pressures and opportunities for owners of woodland.

Forest land covers about 88,960 acres, or about 56 percent of the land area of Camden County. For purposes of forest inventory, the predominant forest types identified in Camden County are as described in the following paragraphs *(9)*.

Loblolly-shortleaf. This forest type covers 8,675 acres. It is predominantly loblolly pine, shortleaf pine, or other kinds of southern yellow pine (excluding longleaf pine and slash pine) or a combination of these species. Commonly included trees are oak, hickory, and gum.

Oak-pine. This forest type covers 2,745 acres. It is predominantly hardwoods, usually upland oaks. Pine species make up 25 to 50 percent of the stand. Commonly included trees are gum, hickory, and yellow-poplar.

Oak-hickory. This forest type covers 26,015 acres. It is predominantly upland oaks or hickory, or both. Commonly included trees are yellow-poplar, elm, maple, and black walnut.

Oak-gum-cypress. This forest type covers 37,080 acres. It is bottom-land forest consisting predominantly of tupelo, blackgum, sweetgum, oaks, southern cypress, or a combination of these species. Commonly included trees are cottonwood, willow, ash, elm, hackberry, and maple.

The landowner interested in timber production is faced with the challenge of producing greater yields from smaller areas. Meeting this challenge requires intensive management and silvicultural practices. Many modern silvicultural techniques resemble those long practiced in agriculture. They include establishing, weeding, and thinning a desirable young stand; propagating the more productive species and genetic varieties; providing short rotations and complete fiber utilization; controlling insects, diseases, and weeds; and improving tree growth by applications of fertilizer and the installation of a drainage system. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture. This goal is to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover about 74,500 acres, or about 48 percent of the land area of Camden County *(9)*. Commercial forest is land that is producing or is capable of producing crops of industrial wood and that has not been withdrawn from timber production. Loblolly pine is the most important timber species in the county because it grows fast, is adapted to the soil and climate, brings the highest average sale value per acre, and is easy to establish and manage.

One of the first steps in planning intensive woodland management is to determine the potential productivity of the soil for several alternative tree species. The most productive and valued trees are then selected for each soil type. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive woodland management, land acquisition, or industrial investments.

The potential productivity of woodland depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine the potential site productivity.

Other site factors are also important. The gradient and length of slopes affect water movement and availability. In mountainous areas, elevation and aspect affect the amount of sunlight a site receives and the rate of evaporation. Sites on south-facing slopes are warmer and drier than those on north-facing slopes. The best sites are generally on north- and east-facing slopes in the lower areas, in sheltered coves, and in gently sloping concave areas. The amount of rainfall and length of growing season influence site productivity.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. The common forest understory plants also are listed. Table 6 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest

use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of the naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings (fig. 12). Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. Plant competition is more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants hinders adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants hinders natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A moderate or severe rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers should plan site preparation measures to ensure timely reforestation.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. The predominant common trees are listed in table 6 in the order of their observed occurrence. Additional species that commonly occur on the soils may be listed in the detailed soil map unit descriptions. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

For soils that are commonly used for timber production, the yield is predicted in cubic feet per acre per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey are based mainly on loblolly pine *(8)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Productivity of a site can be improved through management practices, such as

Figure 12.—Bedding and furrowing in an area of Belhaven muck, 0 to 2 percent slopes.

bedding, ditching, managing water, applying fertilizer, and planting genetically improved species.

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Recreation

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design,

intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains, and is not dusty when dry.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, are not subject to flooding more than once a year during the period of use, and have moderate slopes.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, are not subject to prolonged flooding during the period of use, and have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John P. Edwards, biologist, Natural Resources Conservation Service, helped prepare this section.

Habitat for wildlife in Camden County ranges from inland, freshwater marshes to areas of hardwoods in the uplands.

Woodland and openland habitats suitable for deer, quail, and ducks are plentiful. These conditions are predicted to remain about the same. Habitat suitable for other wildlife, such as bears, rabbits, doves, and geese, is fair. Habitat suitable for squirrels and furbearers is poor or fair. Its quality and quantity are decreasing.

Most of the large farms in the county are in areas of Portsmouth, Wasda, Roper, Hyde, Roanoke, Perquimans, or Tomotley soils. On these farms large-scale land clearing results in big fields and a minimum of edge habitat. Habitat in these cleared areas is generally fair or poor. Shelterbelts, windbreaks, field borders, and conservation tillage can reduce the effects of land clearing on wildlife populations.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 8 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops

are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and pokeberry.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, white-tailed deer, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution,

liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, the shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm, dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. The depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. The depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), the shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from

the office of the Albemarle Soil and Water Conservation District or the local office of the North Carolina Cooperative Extension Service.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. These soils have layers of suitable material, but the material is less than 3 feet thick.

Sand is a natural aggregate suitable for commercial use with a minimum of processing. It is used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand are gradation of grain sizes (as indicated by the engineering classification of the soil) and thickness of suitable material. Reaction and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or a layer that is as much as 12 percent silty fines. This material must be at least 3 feet thick. All other soils are rated as an improbable source.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, mica, or salts or sodium. The depth to a high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability in the aquifer. The depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, subsidence of organic layers, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

Irrigation is the controlled application of water to supplement rainfall and support plant growth (fig. 13). The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the availability of suitable irrigation water, the depth of the root zone, and soil reaction.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct

Figure 13.—A center-pivot irrigation system in a field of corn planted on Tomotley fine sandy loam, 0 to 2 percent slopes.

surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed *(7)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and

in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

The shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water

that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep or very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil listed in table 15 is assigned to two hydrologic groups, the first letter is for drained areas and the second letter is for undrained areas.

Flooding, the temporary covering of the surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is

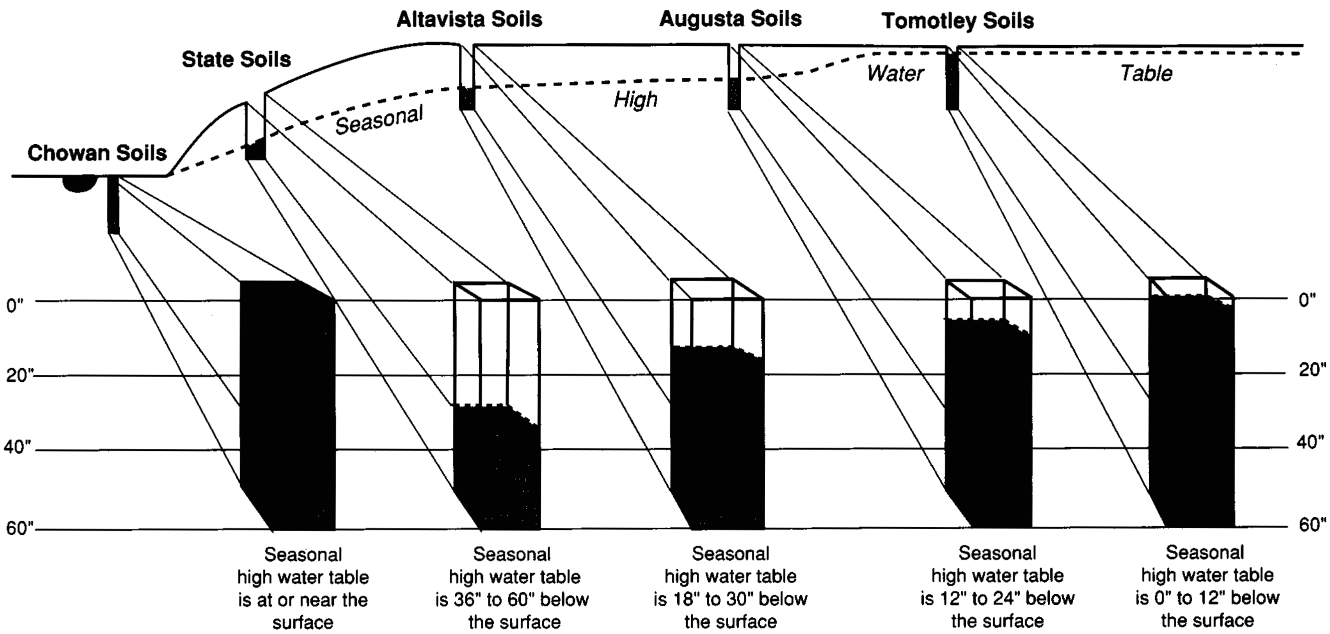

Figure 14.—The depth to a seasonal high water table in selected soils in Camden County.

unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years (fig. 14). The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table, the kind of water table, and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 15. An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that

intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(11)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid climate, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizon development, plus *udult*, the suborder of the Ultisols that occurs in humid climates).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, thermic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the underlying material within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described, and coordinates are identified by the State plane grid system. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(12)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(11)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Altavista Series

The Altavista series consists of moderately well drained soils that formed in loamy marine and fluvial

sediments. Slopes range from 0 to 2 percent.

Altavista soils are commonly adjacent to State, Augusta, and Tomotley soils. State soils are well drained. Augusta soils are somewhat poorly drained. Tomotley soils are poorly drained.

Typical pedon of Altavista fine sandy loam, 0 to 2 percent slopes; about 0.3 mile southwest of the intersection of North Carolina Highway 343 and Secondary Road 1208 on a farm path, 50 feet southeast of the farm path, in a cultivated field (State plane coordinates 2,816,600 feet E., 967,400 feet N.):

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.

Bt1—6 to 13 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; few fine roots; strongly acid; clear smooth boundary.

Bt2—13 to 22 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine distinct yellowish brown (10YR 5/8) and few fine faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3—22 to 36 inches; yellowish brown (10YR 5/4) sandy clay loam; common fine faint yellowish brown (10YR 5/6) and few medium faint grayish brown (10YR 5/2) mottles; weak and moderate medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

BC—36 to 48 inches; light yellowish brown (10YR 6/4) fine sandy loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; very strongly acid; clear smooth boundary.

C—48 to 60 inches; yellowish brown (10YR 5/4) loamy fine sand; common medium faint yellowish brown (10YR 5/6) and brownish yellow (10YR 6/8) mottles; massive; friable; common fine flakes of mica; common opaques; strongly acid.

The solum is 30 to 50 inches thick. Reaction ranges from extremely acid to medium acid.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 4. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 6. It is fine sandy loam or sandy loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. In some pedons the lower part of the Bt horizon has chroma of less than 2; has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2; or has mottles with chroma of less than 2. The Bt horizon is commonly sandy clay loam or clay loam, but in some pedons has thin layers of fine sandy loam, sandy loam, or loam.

The BC horizon, if it occurs, has the same colors as the Bt horizon, has a gray matrix, or is mottled. It is sandy loam, loam, sandy clay loam, or loamy sand.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 8, or it is mottled. It is sandy or loamy. In some pedons it has thin strata of clay.

Augusta Series

The Augusta series consists of somewhat poorly drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Augusta soils are commonly adjacent to Altavista, Tomotley, and State soils. Altavista soils are moderately well drained. Tomotley soils are poorly drained. State soils are well drained.

Typical pedon of Augusta fine sandy loam, 0 to 2 percent slopes; about 5.0 miles north of South Mills, 0.2 mile east of the intersection of Secondary Roads 1232 and 1230, about 40 feet north of Secondary Road 1230, in a cultivated field (State plane coordinates 2,791,800 feet E., 1,012,500 feet N.):

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

Bt1—6 to 15 inches; light olive brown (2.5Y 5/4) sandy clay loam; few fine distinct gray (10YR 5/1) and common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—15 to 30 inches; light olive brown (2.5Y 5/4) sandy clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg1—30 to 38 inches; gray (10YR 6/1) sandy clay loam; common medium distinct strong brown (7.5YR 5/8) and few fine distinct light yellowish brown (2.5Y 6/4) mottles; weak fine subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg2—38 to 44 inches; gray (10YR 5/1) sandy loam; common medium distinct light olive brown

(2.5Y 5/4) and common fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable; few faint clay films on faces of peds; few fine flakes of mica; few opaques; very strongly acid; clear smooth boundary.

Cg1—44 to 68 inches; light gray (10YR 7/1) loamy sand; common coarse distinct brownish yellow (10YR 6/8) and common medium distinct light olive brown (2.5Y 5/4) and light yellowish brown (2.5Y 6/4) mottles; massive; friable; few fine flakes of mica; few opaques; very strongly acid; clear smooth boundary.

Cg2—68 to 72 inches; light gray (10YR 7/1) loamy sand; common fine faint white (10YR 8/2) and few fine prominent strong brown (7.5YR 5/8) mottles; massive; friable; few fine flakes of mica; few opaques; very strongly acid.

The solum extends to a depth of 40 to 70 inches. Reaction ranges from very strongly acid to medium acid, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. The E horizon, if it occurs, has hue of 10YR to 5Y, value of 6 or 7, and chroma of 2 to 4. It is sandy loam, fine sandy loam, or loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 to 6. It has few or common mottles in shades of red, brown, yellow, or gray. The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. The B horizon is commonly sandy clay loam, loam, or clay loam, but in some pedons has thin layers of fine sandy loam or sandy loam.

The C horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 6, or it is neutral in hue and has value of 4 to 7. It is sand, loamy sand, or sandy loam.

Belhaven Series

The Belhaven series consists of very poorly drained soils that formed in organic material over loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Belhaven soils are commonly adjacent to Roper, Wasda, and Pungo soils. Roper soils are organic to a depth of less than 16 inches and are underlain by fine-silty material. Wasda soils are organic to a depth of less than 16 inches and are underlain by fine-loamy material. Pungo soils are organic to a depth of more than 51 inches.

Typical pedon of Belhaven muck, 0 to 2 percent slopes; about 1.5 miles northeast of Tar Corner, 1.0 mile northeast of the intersection of Secondary Roads 1224 and 1229, about 1.8 miles northwest of Secondary Road 1224 on a farm path, 100 feet southeast of the farm path (State plane coordinates 2,663,800 feet E., 1,014,600 feet N.):

Oap—0 to 6 inches; muck, dark reddish brown (5YR 2/2) broken face and rubbed; about 15 percent fibers, less than 1 percent rubbed; about 20 percent mineral material; weak medium granular structure; friable, slightly sticky; many fine roots and stems; about 20 percent wood fragments; few fine and medium pieces of charcoal; extremely acid; clear smooth boundary.

Oa—6 to 22 inches; muck, very dusky red (2.5YR 2/2) broken face and rubbed; about 15 percent fibers, less than 1 percent rubbed; massive; sticky and pastelike; about 20 percent wood fragments; few medium pieces of charcoal; common logs and stumps; extremely acid; clear smooth boundary.

2A—22 to 30 inches; dark brown (7.5YR 3/2) loam; massive; slightly sticky; strongly acid; clear smooth boundary.

2Cg1—30 to 48 inches; grayish brown (10YR 5/2) clay loam; massive; slightly sticky; strongly acid; clear smooth boundary.

2Cg2—48 to 72 inches; light gray (10YR 7/1) sandy clay loam; massive; slightly sticky; strongly acid.

The organic material typically is 16 to 30 inches thick. In some pedons, however, it is a much as 51 inches thick. The organic horizons are extremely acid (in 0.01M $CaCl_2$), except where the surface layer has been limed. The underlying mineral horizons are extremely acid to slightly acid. The content of logs, stumps, and wood fragments ranges from 5 to 35 percent in the organic horizons. The content of pieces of charcoal ranges from 2 to 8 percent in the upper tier and is less than 2 percent in the lower tier.

The surface layer has hue of 5YR to 5Y, value of 2 or 3, and chroma of 1 or 2. The lower tier of organic material has hue of 2.5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It has hue of 5YR or 2.5YR in ten inches or more. The content of fiber throughout the organic material is 15 to 45 percent before rubbing and less than 10 percent after rubbing. In undrained areas the lower tier is pastelike; has a greasy, colloidal consistence; and is massive. In drained areas aeration causes structure to evolve. Excessive drying causes shrinkage and the formation of hard, subangular blocky peds. These peds dry irreversibly.

The 2A horizon, if it occurs, has hue of 2.5YR to 5Y, value of 2 or 3, and chroma of 1 or 2. It is loam, fine sandy loam, sandy loam, or mucky loam.

The 2Cg horizon has hue of 2.5YR to 5Y, value of 3 to 7, and chroma of 1 to 3, or it is neutral in hue and has value of 3 to 7. It is loamy in the upper part and sandy or loamy in the lower part.

Bojac Series

The Bojac series consists of well drained soils that formed in sandy and loamy marine and fluvial sediments. Slopes range from 0 to 3 percent.

Bojac soils are commonly adjacent to Munden, Nimmo, Seabrook, State, and Portsmouth soils. Munden soils are moderately well drained. Nimmo soils are poorly drained. Seabrook soils are moderately well drained and sandy. State soils are well drained and fine-loamy. Portsmouth soils are very poorly drained and fine-loamy.

Typical pedon of Bojac loamy sand, 0 to 3 percent slopes; about 200 feet east of the intersection of Secondary Road 1106 and North Carolina Highway 343, about 75 feet south of Secondary Road 1106, in a cultivated field (State plane coordinates 2,884,700 feet E., 925,300 feet N.):

Ap—0 to 8 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; few fine and medium roots; medium acid; clear smooth boundary.

Bt—8 to 32 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable; bridged and coated sand grains; few fine roots; strongly acid; clear smooth boundary.

C1—32 to 51 inches; reddish yellow (7.5YR 6/8) loamy fine sand; single grained; loose; few opaques; strongly acid; clear smooth boundary.

C2—51 to 60 inches; yellowish brown (10YR 5/8) fine sand; single grained; loose; few opaques; strongly acid; clear smooth boundary.

C3—60 to 72 inches; light yellowish brown (2.5Y 6/4) fine sand; single grained; loose; few opaques; strongly acid.

The solum extends to a depth of 30 to 50 inches. Reaction ranges from extremely acid to medium acid, except where the surface layer has been limed.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 4 to 6. It is loamy sand or loamy fine sand.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is typically fine sandy loam, but in some pedons has thin layers of sandy clay loam or loamy sand.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. It is sand, fine sand, or loamy fine sand.

Cape Fear Series

The Cape Fear series consists of very poorly drained soils that formed in clayey and loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Cape Fear soils are commonly adjacent to Roanoke, Portsmouth, Hyde, and Roper soils. Roanoke soils are poorly drained. Portsmouth soils are fine-loamy. Hyde soils are fine-silty. Roper soils have an organic surface layer and are underlain by fine-silty material.

Typical pedon of Cape Fear silt loam, 0 to 2 percent slopes; about 3.0 miles northwest of South Mills, 0.7 mile northwest on Secondary Road 1220 from the intersection of Secondary Roads 1220 and 1219, about 0.4 mile northeast on a farm path from the end of Secondary Road 1220, about 30 feet northwest of the farm path (State plane coordinates 2,775,500 feet E., 1,000,500 feet N.):

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; common fine roots; very strongly acid; clear smooth boundary.

Btg1—10 to 18 inches; light brownish gray (2.5Y 6/2) clay loam; common medium distinct strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; silt on faces of peds; very strongly acid; gradual smooth boundary.

Btg2—18 to 36 inches; grayish brown (10YR 5/2) clay; common medium distinct light gray (10YR 7/1) and few medium prominent red (2.5YR 4/8) mottles; weak fine subangular blocky structure; firm, sticky and plastic; common distinct dark gray (10YR 4/1) clay films on faces of peds; silt on faces of peds; very strongly acid; clear smooth boundary.

Btg3—36 to 42 inches; gray (10YR 5/1) clay loam; common medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine flakes of mica; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; clear smooth boundary.

BCg—42 to 48 inches; gray (N 6/0) loam; common medium distinct brownish yellow (10YR 6/6) and few fine prominent light brown (7.5YR 6/4) mottles; weak fine subangular blocky structure; friable; few fine flakes of mica; medium acid; clear smooth boundary.

Cg1—48 to 60 inches; greenish gray (5G 5/1) loam; common medium distinct light olive brown (2.5Y 5/4) and common fine distinct brownish yellow (10YR 6/8) mottles; massive; friable; few fine flakes of mica; medium acid; clear smooth boundary.

Cg2—60 to 72 inches; dark greenish gray (5G 4/1)

loam; few fine distinct light olive brown (2.5Y 5/4) mottles; massive; friable; few flakes of mica; medium acid.

The solum extends to a depth of 40 to more than 60 inches. Reaction ranges from extremely acid to medium acid throughout the profile, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. In most pedons it has few or common higher chroma mottles. It is clay, sandy clay, clay loam, loam, or sandy clay loam. The content of clay in the upper 20 inches of the horizon is more than 35 percent.

The BCg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 6. It is sandy clay loam, clay loam, sandy clay, loam, or sandy loam.

The Cg or 2Cg horizon has hue of 10YR to 5Y or 5GY to 5BG, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. It is sandy loam, fine sandy loam, loam, loamy sand, or loamy fine sand.

Chapanoke Series

The Chapanoke series consists of somewhat poorly drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Chapanoke soils are commonly adjacent to Yeopim, Perquimans, Roanoke, and Hyde soils. Yeopim soils are moderately well drained. Perquimans soils are poorly drained. Roanoke soils are poorly drained and clayey. Hyde soils are very poorly drained.

Typical pedon of Chapanoke silt loam, 0 to 2 percent slopes; about 2.0 miles southeast of Camden, 0.2 mile west of the intersection of Secondary Roads 1136 and 1137, about 300 feet south of Secondary Road 1136, in a field (State plane coordinates 2,843,400 feet E., 948,700 feet N.):

Ap—0 to 6 inches; brown (10YR 5/3) silt loam; weak medium granular structure; friable; few fine and medium roots; medium acid; abrupt smooth boundary.

Bt—6 to 19 inches; light yellowish brown (2.5Y 6/4) loam; common fine distinct light brownish gray (2.5Y 6/2) and reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; few distinct light olive brown (2.5Y 5/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Btg1—19 to 32 inches; light gray (10YR 7/1) loam; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; few distinct light brownish gray (2.5Y 6/2) clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Btg2—32 to 41 inches; gray (10YR 6/1) loam; common medium distinct light yellowish brown (2.5Y 6/4) and few medium distinct strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid; gradual smooth boundary.

C—41 to 46 inches; brownish yellow (10YR 6/6) loam; common medium distinct gray (10YR 6/1) and common fine distinct yellowish red (5YR 4/6) mottles; weak medium granular structure; friable; common fine flakes of mica; few fine opaques; medium acid; gradual smooth boundary.

Cg—46 to 72 inches; light olive gray (5Y 6/2) loamy fine sand; common coarse distinct light olive brown (2.5Y 5/4) and few fine prominent strong brown (7.5YR 5/6) mottles; massive; friable; few fine flakes of mica; many fine opaques; medium acid.

The solum extends to a depth of 40 to more than 60 inches. Very fine sand dominates the sand fraction of the particle-size control section. Reaction ranges from extremely acid to medium acid, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 to 6, or it is neutral in hue and has value of 4 to 7. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 3. It is silt loam, loam, fine sandy loam, or very fine sandy loam.

The AB or BA horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 6. It has few or common high- and low-chroma mottles. It is loam, silt loam, or very fine sandy loam.

The Bt horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 3 to 8. It has lower chroma mottles. In most pedons it also has high-chroma mottles.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. In most pedons it has high-chroma mottles. It is commonly loam, but in some pedons it is silty clay loam, clay loam, silt loam, or very fine sandy loam.

The BC or CB horizon, if it occurs, has colors similar to those in the lower part of the Btg horizon. It is silt loam, loam, loamy fine sand, fine sandy loam, very fine sandy loam, or sandy clay loam.

The C horizon has hue of 7.5YR to 5Y, value of 4 to

7, and chroma of 1 to 8, or it is neutral in hue and has value of 4 to 7. It is typically sandy or loamy, but in some pedons has thin strata of clay.

Chowan Series

The Chowan series consists of poorly drained soils that have mineral horizons over highly decomposed organic material. Slopes range from 0 to 2 percent.

Chowan soils are commonly adjacent to Dorovan soils. Dorovan soils do not have overlying mineral horizons.

Typical pedon of Chowan silt loam, 0 to 2 percent slopes, frequently flooded; about 2.5 miles east of Camden, 0.3 mile north of the intersection of Secondary Roads 1137 and 1136, about 100 feet east of Secondary Road 1137, in a creek bottom (State plane coordinates 2,843,400 feet E., 948,700 feet N.):

A—0 to 6 inches; dark gray (10YR 4/1) silt loam; massive; friable, slightly sticky; common medium and coarse roots; strongly acid; gradual wavy boundary.

Cg—6 to 32 inches; gray (10YR 5/1) silty clay loam; massive; friable, sticky; common coarse roots; strongly acid; gradual wavy boundary.

2Oa—32 to 72 inches; dark reddish brown (5YR 2/2) muck; about 15 percent fibers, less than 5 percent rubbed; massive; very friable; common logs and stumps; extremely acid.

The mineral horizons extend to a depth of 16 to 40 inches. The underlying organic horizon is 16 to more than 80 inches thick. Reaction ranges from extremely acid to medium acid in the mineral horizons and is extremely acid or very strongly acid in the organic horizon.

The A horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. In pedons where value is less than 3.5, the horizon is less than 10 inches thick.

The Cg horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. It is loam, silt loam, silty clay loam, or mucky silt loam.

The 2Oa horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3. It is 16 inches to several feet thick. In most pedons it has common stumps and logs.

Dorovan Series

The Dorovan series consists of very poorly drained, organic soils. The organic layers are more than 51 inches thick over unconsolidated fluvial sediments. Slope is 0 to 1 percent.

Dorovan soils are commonly adjacent to Chowan and Hobonny soils. Chowan soils have mineral horizons that have a combined thickness of more than 20 inches overlying organic material. Hobonny soils support marsh vegetation and show evidence of saltwater intrusion.

Typical pedon of Dorovan muck, 0 to 1 percent slopes, frequently flooded; about 0.9 mile south of the intersection of Secondary Road 1219 and U.S. Highway 17, about 100 feet east of U.S. Highway 17 (State plane coordinates 2,782,300 feet E., 986,100 feet N.):

Oa1—0 to 20 inches; dark reddish brown (5YR 3/2) muck; about 20 percent fiber unrubbed, 5 percent rubbed; massive; slightly sticky; common medium roots; extremely acid; gradual wavy boundary.

Oa2—20 to 55 inches; black (5YR 2/1) muck; about 15 percent fiber unrubbed, 5 percent rubbed; massive; slightly sticky; common medium roots; extremely acid; diffuse wavy boundary.

Oa3—55 to 80 inches; black (10YR 2/1) muck; about 15 percent fiber unrubbed, 5 percent rubbed; common coarse roots; massive; slightly sticky; extremely acid.

The organic material is 51 to more than 80 inches thick. Reaction is extremely acid in the organic layers. The 2C horizon, if it occurs, is very strongly acid or strongly acid.

The Oe horizon, if it occurs, has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. The content of fiber is 40 to 90 percent before rubbing and 20 to 60 percent after rubbing.

The Oa horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3. The content of fiber is 10 to 40 percent before rubbing and less than 17 percent after rubbing.

The 2Cg horizon, if it occurs, has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2, or it is neutral in hue and has value of 3 to 5. The texture ranges from sand to clay.

Hobonny Series

The Hobonny series consists of very poorly drained, organic soils. Slope is 0 to 1 percent.

Hobonny soils are commonly adjacent to Dorovan soils. Dorovan soils support natural vegetation.

Typical pedon of Hobonny muck, 0 to 1 percent slopes, frequently flooded; about 10.0 miles southeast of Old Trap, 3.3 miles south on Secondary Road 1100 from the intersection of Secondary Roads 1100 and 1101, about 0.7 mile east on Camden Road, about 4.0 miles east on Sailboat Road, about 1.4 miles northwest on Little Creek Road, 200 feet northeast of Little Creek Road, in a marsh (State plane coordinates 2,900,400 feet E., 900,500 feet N.):

Oa1—0 to 18 inches; black (5YR 2/1) muck; about 40 percent fibers unrubbed, 10 percent rubbed; massive; friable; many fine to coarse roots; very strongly acid; gradual wavy boundary.

Oa2—18 to 80 inches; dark reddish brown (5YR 2/2) muck; about 20 percent fibers unrubbed, 5 percent rubbed; massive; friable; common medium and fine roots; very strongly acid.

The organic material typically is 51 to more than 80 inches thick. Reaction ranges from extremely acid to strongly acid in the organic layers and is very strongly acid or strongly acid in some part of the control section. The 2C horizon, if it occurs, is very strongly acid to medium acid.

The A horizon, if it occurs, has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1.

The 2C horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. It is loam, silt loam, sandy clay loam, or clay loam.

The Oa horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 4. The content of fiber after rubbing is less than 20 percent in the surface tier and less than 10 percent in the lower tier.

Hyde Series

The Hyde series consists of very poorly drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Hyde soils are commonly adjacent to Perquimans, Cape Fear, Chapanoke, Portsmouth, and Roper soils. Perquimans soils are poorly drained. Cape Fear soils are clayey. Chapanoke soils are somewhat poorly drained. Portsmouth soils are fine-loamy. Roper soils have an organic surface horizon that is less than 16 inches thick.

Typical pedon of Hyde silt loam, 0 to 2 percent slopes; about 1.6 miles north of Belcross, 1.2 miles north of the intersection of North Carolina Highway 34 and U.S. Highway 158, about 50 feet west of North Carolina Highway 34, in a cultivated field (State plane coordinates 2,838,500 feet E., 963,500 feet N.):

Ap—0 to 11 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; few fine and medium roots; medium acid; clear smooth boundary.

Btg1—11 to 16 inches; dark gray (10YR 4/1) silty clay loam; weak medium subangular blocky structure; friable, slightly sticky; few fine and medium roots; some root channels filled with surface material; few distinct gray (10YR 5/1) clay films on faces of peds; strongly acid; clear smooth boundary.

Btg2—16 to 26 inches; dark grayish brown (10YR 4/2) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable, slightly sticky; few fine and medium roots; some root channels filled with surface material; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Btg3—26 to 33 inches; light brownish gray (10YR 6/2) loam; few medium faint dark grayish brown (10YR 4/2) mottles; weak fine subangular blocky structure; friable; few faint clay films on faces of peds; common fine flakes of mica; strongly acid; clear smooth boundary.

Btg4—33 to 40 inches; light gray (10YR 7/2) clay loam; common fine faint gray (10YR 5/1) and common fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable; few fine flakes of mica; strongly acid; clear smooth boundary.

Cg1—40 to 45 inches; gray (10YR 6/1) fine sandy loam; common medium distinct brownish yellow (10YR 6/6) and common fine prominent yellowish red (5YR 5/8) mottles; massive; friable; few fine flakes of mica; strongly acid; clear smooth boundary.

Cg2—45 to 72 inches; gray (10YR 6/1) fine sandy loam; common coarse distinct light yellowish brown (2.5Y 6/4) and common medium distinct strong brown (7.5YR 5/8) mottles; massive; friable; few fine flakes of mica; strongly acid.

The solum extends to a depth of 35 to 60 inches. Reaction in the A and B horizons ranges from extremely acid to strongly acid, except where the surface layer has been limed. The C horizon ranges from extremely acid to neutral.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. It has few or common mottles in shades of brown or red. It is silty clay loam, loam, clay loam, or silt loam.

The Cg horizon has hue of 10YR, 2.5Y, 5Y, 5G, 5GY, or 5BG, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. It is loam, sandy loam, loamy sand, sandy clay loam, fine sandy loam, or loamy fine sand.

Munden Series

The Munden series consists of moderately well drained soils that formed in loamy and sandy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Munden soils are commonly adjacent to Bojac, Nimmo, Seabrook, Tomotley, and State soils. Bojac

soils are well drained. Nimmo soils are poorly drained. Seabrook soils are sandy. Tomotley soils are poorly drained and fine-loamy. State soils are well drained and fine-loamy.

Typical pedon of Munden loamy sand, 0 to 2 percent slopes; about 3 miles north of Belcross, 0.8 mile north of the intersection of Secondary Roads 1145 and 1207, about 0.1 mile east of Secondary Road 1145 on a farm path, 20 feet south of the farm path (State plane coordinates 2,831,800 feet E., 966,400 feet N.):

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loamy sand; weak medium granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; very friable; few coarse roots; few faint clay films on faces of peds; common opaques; very strongly acid; clear smooth boundary.

Bt2—16 to 25 inches; brownish yellow (10YR 6/6) sandy loam; common medium distinct light brownish gray (10YR 6/2) and few medium distinct strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; few faint clay films on faces of peds; very friable; common opaques; very strongly acid; clear smooth boundary.

Btg—25 to 37 inches; light brownish gray (2.5Y 6/2) sandy loam; common coarse distinct yellowish brown (10YR 5/6) and few medium distinct light brown (7.5YR 6/4) mottles; weak medium subangular blocky structure; very friable; common opaques; very strongly acid; gradual smooth boundary.

C—37 to 60 inches; yellow (10YR 7/6) sand; common medium faint yellowish brown (10YR 5/8), common medium distinct light yellowish brown (2.5Y 6/4), and common fine prominent red (2.5YR 4/8) mottles; single grained; loose; common opaques; medium acid; clear smooth boundary.

Cg—60 to 72 inches; light gray (10YR 7/2) sand; common medium distinct yellow (10YR 7/6) mottles; single grained; loose; common opaques; medium acid.

The solum extends to a depth of 25 to 45 inches. The soil ranges from very strongly acid to medium acid, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 6. It is loamy sand, loamy fine sand, sandy loam, or fine sandy loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It commonly has few or common low-chroma mottles below the upper 7 inches of the horizon. It is sandy loam or fine sandy loam.

The Btg horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 or 2. It has textures similar to those of the overlying Bt horizon.

The BC or CB horizon, if it occurs, has colors similar to those of the Bt or Btg horizon or is mottled with high- and low-chroma mottles. It is loamy sand, loamy fine sand, fine sandy loam, or sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 2 to 8; is neutral in hue and has value of 5 to 7; or is mottled in shades of red, yellow, brown, or gray. It is loamy sand, sandy loam, fine sandy loam, loamy fine sand, fine sand, or sand.

Nimmo Series

The Nimmo series consists of poorly drained soils that formed in loamy and sandy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Nimmo soils are commonly adjacent to Bojac, Munden, Tomotley, Portsmouth, and Seabrook soils. Bojac soils are well drained. Munden soils are moderately well drained. Tomotley soils are fine-loamy. Portsmouth soils are very poorly drained and fine-loamy. Seabrook soils are moderately well drained and sandy.

Typical pedon of Nimmo sandy loam, 0 to 2 percent slopes; about 1 mile south of Belcross, 0.3 mile west of the intersection of North Carolina Highway 34 and Secondary Road 1201, about 30 feet south of Secondary Road 1201 (State plane coordinates 2,836,500 feet E., 960,300 feet N.):

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) sandy loam; weak medium granular structure; friable; few fine and medium roots; strongly acid; abrupt smooth boundary.

Btg1—7 to 13 inches; light brownish gray (2.5Y 6/2) sandy loam; few fine distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; few fine roots; many sand grains coated and bridged with clay; strongly acid; gradual smooth boundary.

Btg2—13 to 41 inches; light brownish gray (2.5Y 6/2) sandy loam; weak fine subangular blocky structure; friable; many sand grains coated and bridged with clay; few fine flakes of mica; few opaques; strongly acid; gradual smooth boundary.

BCg—41 to 52 inches; grayish brown (2.5Y 5/2) loamy sand; common medium faint light brownish gray (2.5Y 6/2) mottles; weak fine subangular blocky structure; friable; many sand grains coated and bridged with clay; few fine flakes of mica; few opaques; strongly acid; clear smooth boundary.

Cg—52 to 72 inches; light gray (2.5Y 7/2) sand; few coarse faint grayish brown (2.5Y 5/2) mottles; single grained; loose; few fine flakes of mica; few opaques; strongly acid.

The solum extends to a depth of 35 to 55 inches. The soil ranges from extremely acid to strongly acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2. In pedons where value is 2 or 3, the horizon is less than 6 inches thick.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. Higher chroma mottles are common. The Btg horizon commonly is sandy loam or fine sandy loam, but in some pedons it has thin layers of sandy clay loam or it is loamy sand in the lower part.

The BCg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It is loamy sand or loamy fine sand.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 8, and chroma of 1 to 8, or it is neutral in hue and has value of 3 to 8. It is sand, fine sand, or loamy sand.

Perquimans Series

The Perquimans series consists of poorly drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Perquimans soils are commonly adjacent to Yeopim, Chapanoke, Hyde, Tomotley, and Roanoke soils. Yeopim soils are moderately well drained. Chapanoke soils are somewhat poorly drained. Hyde soils are very poorly drained. Tomotley soils are fine-loamy. Roanoke soils are clayey.

Typical pedon of Perquimans silt loam, 0 to 2 percent slopes; about 3.0 miles southeast of Camden, 0.3 mile south of the intersection of Secondary Roads 1136 and 1129, about 50 feet east of Secondary Road 1129, in a cultivated field (State plane coordinates 2,844,800 feet E., 946,400 feet N.):

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; common fine and medium roots; few fine vesicular pores; slightly acid; clear smooth boundary.

Btg1—8 to 16 inches; light gray (5Y 7/1) silt loam; common fine distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; common fine roots; few faint gray clay films on faces of peds; medium acid; clear smooth boundary.

Btg2—16 to 28 inches; light brownish gray (2.5Y 6/2) loam; common medium distinct yellowish brown (10YR 5/6) and common fine distinct very pale brown (10YR 7/4) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

Btg3—28 to 60 inches; light gray (10YR 7/1) loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; few distinct gray (10YR 6/1) clay films on faces of peds; few fine flakes of mica; strongly acid; clear smooth boundary.

BCg—60 to 65 inches; gray (10YR 6/1) sandy clay loam; few medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.

Cg—65 to 72 inches; grayish brown (2.5Y 5/2) fine sandy loam; common coarse distinct light olive brown (2.5Y 5/4) and common medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; few fine flakes of mica; medium acid.

The solum extends to a depth of 40 to more than 60 inches. Reaction ranges from very strongly acid to medium acid, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR to 5Y, value of 2 to 6, and chroma of 1 to 3, or it is neutral in hue and has value of 2 to 6. In pedons where value is 3 or less, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is silt loam, loam, or very fine sandy loam.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It has few to many higher chroma mottles. It is typically loam, silty clay loam, or clay loam, but in some pedons has thin layers of silt loam or sandy loam.

The BC or CB horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It has few to many higher chroma mottles. It is loam, silt loam, sandy loam, or sandy clay loam.

The C horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 8, and chroma of 1 to 4, or it is neutral in hue and has value of 5 to 8. It is typically sandy or loamy, but in some pedons has thin strata of clay.

Portsmouth Series

The Portsmouth series consists of very poorly drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Portsmouth soils are commonly adjacent to Tomotley, Hyde, Cape Fear, Wasda, Roper, Nimmo,

and Bojac soils. Tomotley soils are poorly drained. Hyde soils are fine-silty. Cape Fear soils are clayey. Wasda soils are organic to a depth of less than 16 inches. Roper soils are organic to a depth of less than 16 inches and are fine-silty. Nimmo soils are poorly drained and coarse-loamy. Bojac soils are well drained and coarse-loamy.

Typical pedon of Portsmouth fine sandy loam, 0 to 2 percent slopes; about 0.9 mile northeast of the intersection of North Carolina Highway 343 and Secondary Road 1210, about 70 feet north of Secondary Road 1210, in a cultivated field (State plane coordinates 2,804,400 feet E., 980,700 feet N.):

Ap—0 to 11 inches; black (10YR 2/1) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; very friable; few fine roots; extremely acid; clear smooth boundary.

Btg—11 to 29 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) and strong brown (7.5YR 4/8) mottles; weak medium subangular blocky structure; friable; few fine roots; very strongly acid; clear smooth boundary.

2Cg—29 to 65 inches; light gray (10YR 7/2) sand; single grained; loose; few fine flakes of mica; common opaques; medium acid.

The solum extends to a depth of 24 to 40 inches. Reaction ranges from extremely acid to strongly acid in the solum, except where the surface layer has been limed. The C horizon ranges from extremely acid to medium acid. Few or common flakes of mica and other weatherable minerals are throughout the profile in most pedons.

The A or Ap horizon typically has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The E horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is sandy loam, fine sandy loam, loam, or the mucky analogs of those textures.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. In some pedons it has mottles in shades of brown, yellow, and red. It is typically sandy clay loam, loam, or clay loam, but in some pedons has thin layers of sandy loam or loamy sand.

The 2Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 5 to 7. In some pedons it has mottles in shades of brown and yellow. It is typically sand or loamy sand, but in some pedons has strata or pockets and lenses of sandy loam, clay loam, or sandy clay loam.

Pungo Series

The Pungo series consists of very poorly drained, organic soils. The organic layers are more than 51 inches thick over loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Pungo soils are adjacent to Belhaven soils. Belhaven soils are organic to a depth of 16 to 51 inches.

Typical pedon of Pungo muck, 0 to 2 percent slopes; about 2.5 miles northeast of Tar Corner, 2.5 miles north of the intersection of Secondary Roads 1224 and 1225, about 100 feet southeast of Secondary Road 1224 (State plane coordinates 2,807,800 feet E., 1,011,300 feet N.):

Oa1—0 to 6 inches; muck, black (5YR 2/1) broken face and rubbed; about 5 percent fibers, less than 1 percent rubbed; weak medium granular structure; friable; few fine and medium roots; common logs, stumps, and roots; extremely acid; clear smooth boundary.

Oa2—6 to 44 inches; muck, dark reddish brown (5YR 2/2) broken face and rubbed; about 10 percent fibers, less than 1 percent rubbed; massive; sticky, pastelike, and greasy; few medium roots; many stumps and logs; extremely acid; gradual smooth boundary.

Oa3—44 to 62 inches; muck, dark reddish brown (5YR 2/2) broken face and rubbed; about 15 percent fibers, less than 2 percent rubbed; massive; sticky, pastelike, and greasy; many logs, stumps, and roots; extremely acid; gradual smooth boundary.

Oa4—62 to 97 inches; muck, black (10YR 2/1) broken faced and rubbed; about 5 percent fibers, less than 1 percent rubbed; massive; sticky, greasy; common stumps and logs; extremely acid; clear smooth boundary.

2Cg—97 to 99 inches; gray (5Y 5/1) loam; massive; friable; very strongly acid.

The organic material is 51 to more than 90 inches thick. Reaction is extremely acid throughout the organic horizons, except where the surface layer has been limed. The underlying mineral material is extremely acid to strongly acid. The content of logs, stumps, and roots in the surface and subsurface layers is as much as 35 percent, by volume. Before rubbing the content of fiber ranges from 2 to 60 percent throughout the profile. In some pedons, the content of fiber after rubbing is as much as 12 percent in the middle and lower tiers. The content of charcoal ranges from common in the surface layer to few in the subsurface layers.

The surface layer has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. The subsurface tiers have hue of 2.5YR to 5Y, value of 2 or 3, and chroma of 1

to 4. They have hue of 5YR or 2.5YR in ten inches or more. The organic material is massive and pastelike or has a greasy consistence when saturated. If allowed to aerate slowly after drainage and subsidence, the organic material forms weak subangular blocky structure. If this material dries over a short period of time, it shrinks and dries irreversibly.

The 2Cg horizon has hue of 7.5YR to 5Y or 5GY to 5BG, value of 3 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 3 to 7. It is loamy or clayey.

Roanoke Series

The Roanoke series consists of poorly drained soils that formed in marine and fluvial sediments. Slopes range from 0 to 2 percent.

Roanoke soils are commonly adjacent to Cape Fear, Wasda, Yeopim, Perquimans, Chapanoke, and Tomotley soils. Cape Fear soils are very poorly drained. Wasda soils are very poorly drained, have an organic surface horizon, and are fine-loamy. Yeopim soils are moderately well drained and fine-silty. Perquimans soils are fine-silty. Chapanoke soils are somewhat poorly drained and fine-silty. Tomotley soils are fine-loamy.

Typical pedon of Roanoke silt loam, 0 to 2 percent slopes; about 3 miles north of Shiloh, 0.3 mile north of the intersection of Secondary Roads 1116 and 1121, about 0.1 mile west of Secondary Road 1121 on a farm path, 40 feet north of the path, in a cultivated field (State plane coordinates 2,861,000 feet E., 946,400 feet N.):

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam; weak medium granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

BEg—6 to 11 inches; grayish brown (2.5Y 5/2) silt loam; common fine faint light olive brown (2.5Y 5/4) and few fine distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; strongly acid; clear smooth boundary.

Btg1—11 to 31 inches; gray (10YR 6/1) clay; common medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few distinct light brownish gray (2.5Y 6/2) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg2—31 to 40 inches; light gray (10YR 7/1) clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few distinct light brownish gray (2.5Y 6/2) clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Btg3—40 to 47 inches; grayish brown (10YR 5/2) loam; common medium distinct strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; few fine flakes of mica; few opaques; very strongly acid; clear smooth boundary.

Cg1—47 to 67 inches; gray (10YR 5/1) loam; common medium distinct dark yellowish brown (10YR 4/6) mottles; massive; friable; few fine flakes of mica; few opaques; very strongly acid; clear smooth boundary.

Cg2—67 to 72 inches; dark gray (5Y 4/1) loam; massive; friable; few fine flakes of mica; few opaques; very strongly acid.

The solum extends to a depth of 40 to 60 inches. Reaction is extremely acid to strongly acid, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2. The BE horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. It is loam or silt loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It has common mottles in shades of yellow and brown. It is typically clay, clay loam, or silty clay, but in some pedons has thin layers of silty clay loam, sandy clay loam, silt loam, or loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It is loam, sandy loam, loamy sand, or sand, or it is stratified.

Roper Series

The Roper series consists of very poorly drained soils that formed in loamy marine deposits under extremely wet conditions. Slopes range from 0 to 2 percent.

Roper soils are commonly adjacent to Belhaven, Cape Fear, Portsmouth, Wasda, and Hyde soils. Belhaven soils are organic to a depth of 16 to 51 inches. Cape Fear soils do not have a histic epipedon and are clayey. Portsmouth soils do not have a histic epipedon and are fine-loamy. Wasda soils are fine-loamy. Hyde soils do not have a histic epipedon.

Typical pedon of Roper muck, 0 to 2 percent slopes; in the area of Hales Lake, 1.2 miles north of the northeast corner of Secondary Road 1207, through gate of Hales Lake Hunt Club, 0.5 mile west of Hales Lake Road on a dirt path to the end of the path, 0.1 mile north, 90 feet west of a dirt path, in a cultivated field (State plane coordinates 2,827,500 feet E., 978,900 feet N.):

Oap—0 to 6 inches; muck, black (10YR 2/1) broken face and rubbed; less than 1 percent fibers rubbed; weak fine granular structure; very friable; few fine

roots; extremely acid; clear smooth boundary.
Oa—6 to 11 inches; muck, black (10YR 2/1) broken face and rubbed; less than 1 percent fibers rubbed; weak fine subangular blocky structure; very friable; few fine roots; extremely acid; clear smooth boundary.
A—11 to 17 inches; very dark grayish brown (10YR 3/2) mucky loam; weak medium subangular blocky structure; friable; common fine and medium roots; extremely acid; clear smooth boundary.
Bg1—17 to 26 inches; very dark gray (10YR 3/1) loam; weak medium subangular blocky structure; friable; common fine and medium roots; extremely acid; gradual smooth boundary.
Bg2—26 to 41 inches; dark gray (10YR 4/1) loam; common medium distinct dark grayish brown (10YR 4/2) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few lenses of sand and clay; extremely acid; gradual smooth boundary.
2Cg1—41 to 50 inches; greenish gray (5GY 5/1) sandy clay loam; common medium distinct dark gray (5Y 4/1) mottles; massive; friable; few fine flakes of mica; extremely acid; clear smooth boundary.
2Cg2—50 to 65 inches; grayish green (5G 4/2) sandy clay loam; common medium distinct gray (5Y 6/1) and greenish gray (5BG 5/1) mottles; massive; friable; few fine tubular pores; few fine flakes of mica; medium acid; clear smooth boundary.
2Cg3—65 to 72 inches; dark greenish gray (5GY 4/1) sandy loam; massive; common fine flakes of mica; extremely acid.

The solum is 40 to more than 60 inches thick. Reaction ranges from extremely acid to strongly acid in the upper part of the control section and from extremely acid to mildly alkaline in the lower part of the control section and in the C horizon. In some pedons charcoal fragments are common in the organic horizons. Few or common fine flakes of mica are throughout the lower part of the soil.

The Oa horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 4. It has weak or moderate medium and fine granular structure in undrained areas and weak or moderate medium subangular blocky structure in drained areas. The content of fiber ranges from 2 to 15 percent before rubbing and from 0 to 4 percent after rubbing.

The A horizon, if it occurs, has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 or 2. It is silt loam, clay loam, mucky silt loam, mucky loam, or loam.

The Bg horizon has hue of 10YR, 2.5Y, 5Y, or 5GY, value of 3 to 6, and chroma of 1 or 2. In some pedons it has few or common higher chroma mottles. It is typically silty clay loam, loam, or silt loam, but in some pedons has thin strata of clay loam or silty clay.

The Cg horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2; has hue of 5GY to 5G, value of 4 to 6, and chroma of 1 or 2; or is neutral in hue and has value of 3 to 5. It varies in texture from sand to clay.

Seabrook Series

The Seabrook series consists of moderately well drained soils that formed in sandy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Seabrook soils are commonly adjacent to Bojac, Munden, and Nimmo soils. Bojac soils are well drained and coarse-loamy. Munden soils are coarse-loamy. Nimmo soils are poorly drained and coarse-loamy.

Typical pedon of Seabrook fine sand, 0 to 2 percent slopes; about 1.2 miles north on Secondary Road 1145 from Hastings Corner, 0.5 mile west of Secondary Road 1145 on a farm path, 0.1 mile north of the farm path (State plane coordinates 2,829,500 feet E., 965,900 feet N.):

Ap—0 to 7 inches; dark brown (10YR 3/3) fine sand; weak fine granular structure; very friable; few fine and medium roots; strongly acid; clear smooth boundary.
C1—7 to 25 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; few opaques; medium acid; clear smooth boundary.
C2—25 to 38 inches; very pale brown (10YR 7/4) fine sand; common medium distinct light gray (10YR 7/2) mottles; single grained; loose; common opaques; strongly acid; clear smooth boundary.
Cg1—38 to 62 inches; light brownish gray (2.5Y 6/2) sand; single grained; loose; common opaques; medium acid; clear smooth boundary.
Cg2—62 to 74 inches; light gray (2.5Y 7/2) sand; common medium distinct olive yellow (2.5Y 6/6) and few medium distinct strong brown (7.5YR 5/8) mottles; single grained; loose; common opaques; medium acid.

The soil extends to a depth of 72 inches or more. Reaction ranges from very strongly acid to slightly acid throughout the profile, except where the surface layer has been limed.

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3.

The upper part of the C horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 to 8. The lower part has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. The horizon is fine sand, sand, loamy fine sand, or loamy sand.

State Series

The State series consists of well drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 6 percent.

State soils are commonly adjacent to Altavista, Augusta, Tomotley, Bojac, and Munden soils. Altavista soils are moderately well drained. Augusta soils are somewhat poorly drained. Tomotley soils are poorly drained. Bojac soils are coarse-loamy. Munden soils are moderately well drained and coarse-loamy.

Typical pedon of State fine sandy loam, 0 to 2 percent slopes; about 0.7 mile northeast of Camden, 0.3 mile northeast of the intersection of U.S. Highway 158 and Secondary Road 1142, about 150 feet northwest of U.S. Highway 158, in a cultivated field (State plane coordinates 2,835,500 feet E., 953,000 feet N.):

Ap—0 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable; common fine roots; strongly acid; abrupt smooth boundary.

Bt1—8 to 20 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky; few distinct brown (7.5YR 5/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—20 to 34 inches; yellowish brown (10YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky; few distinct yellowish brown (10YR 5/6) clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt3—34 to 42 inches; brownish yellow (10YR 6/8) sandy loam; weak fine subangular blocky structure; friable; few fine flakes of mica; few opaques; medium acid; clear smooth boundary.

Cg—42 to 66 inches; gray (N 6/0) sandy loam; common medium prominent strong brown (7.5YR 5/8) mottles; massive; friable; few fine flakes of mica; few opaques; slightly acid; gradual smooth boundary.

C—66 to 72 inches; light olive brown (2.5Y 5/4) sand; single grained; loose; few fine flakes of mica; few opaques; slightly acid.

The solum extends to a depth of 35 to 60 inches. Reaction ranges from extremely acid to strongly acid throughout the A horizon and the upper part of the B horizon, except where the surface layer has been limed, and from extremely acid to slightly acid in the lower part of the B horizon and in the C horizon.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 8. It is loamy fine sand, loamy sand, sandy loam, or fine sandy loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is typically sandy clay loam or clay loam, but in some pedons has thin layers of fine sandy loam or sandy loam. The sandy textures do not occur within 40 inches of the surface.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8, or it is neutral in hue and has value of 4 to 7. It is fine sand, sand, loamy sand, or sandy loam.

Tomotley Series

The Tomotley series consists of poorly drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Tomotley soils are commonly adjacent to State, Altavista, Augusta, Portsmouth, Perquimans, Nimmo, and Roanoke soils. State soils are well drained. Altavista soils are moderately well drained. Augusta soils are somewhat poorly drained. Portsmouth soils are very poorly drained. Perquimans soils are fine-silty. Nimmo soils are coarse-loamy. Roanoke soils are clayey.

Typical pedon of Tomotley fine sandy loam, 0 to 2 percent slopes; about 1.1 miles south of Tar Corner, 0.2 mile north of the intersection of Secondary Roads 1249 and 1224, about 50 feet east of Secondary Road 1224, in a cultivated field (State plane coordinates 2,797,700 feet E., 1,000,700 feet N.):

Ap—0 to 8 inches; dark grayish brown (10YR 4/ 2) fine sandy loam; weak medium granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

Btg1—8 to 13 inches; grayish brown (10YR 5/2) sandy clay loam; few medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak fine subangular blocky structure; friable; few faint clay films on faces of peds; few fine roots; very strongly acid; clear smooth boundary.

Btg2—13 to 19 inches; grayish brown (2.5Y 5/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg3—19 to 33 inches; gray (10YR 5/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) and few fine faint gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; extremely acid; gradual smooth boundary.

Btg4—33 to 38 inches; grayish brown (10YR 5/2) sandy

clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine flakes of mica; common opaques; very strongly acid; clear smooth boundary.

BCg—38 to 43 inches; light brownish gray (2.5Y 6/2) sandy loam; common medium distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable; few fine flakes of mica; very strongly acid; clear smooth boundary.

Cg—43 to 60 inches; gray (10YR 6/1) loamy sand; massive; friable; few fine flakes of mica; very strongly acid.

The solum extends to a depth of 40 to 60 inches. Reaction ranges from extremely acid to strongly acid in the upper part of the profile and from extremely acid to medium acid in the lower part.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It is sandy loam or fine sandy loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. It is typically loam or sandy clay loam, but in some pedons has thin layers of sandy loam or fine sandy loam.

The BCg or CBg horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. In most pedons it has few to many mottles in shades of gray, olive, yellow, brown, or red. It is fine sandy loam, sandy loam, loam, clay loam, sandy clay loam, silt loam, or sandy clay.

The C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 4. It is mottled in shades of red, olive, yellow, brown, or gray. It is sandy loam, loamy sand, or sand.

Udorthents

Udorthents consist of areas where the natural soil has either been destroyed or covered by earthy fill material. These areas are somewhat poorly drained or poorly drained. They are dredge and fill areas or areas of landfill. The fill areas are sites where at least 20 inches of earthy fill material covers the natural soil or where natural drainageways or low areas have been filled. Slopes are nearly level or gently sloping.

A typical pedon is not given for these soils because of their variability. The fill areas are mainly more than 20 inches deep and are as thick as 10 feet in places. The soils are stratified and vary in color and texture.

Udorthents have hue of 7.5YR to 5GY, value of 3 to 7, and chroma of 1 to 8. The texture ranges from sandy loam to silty clay loam. Reaction ranges from extremely acid to slightly acid.

Wasda Series

The Wasda series consists of very poorly drained soils that formed in marine sediments. Slopes range from 0 to 2 percent.

Wasda soils are commonly adjacent to Roper, Portsmouth, Belhaven, and Roanoke soils. Roper soils are underlain by fine-silty material. Portsmouth soils do not have a histic epipedon. Belhaven soils are organic to a depth of more than 16 inches. Roanoke soils are poorly drained and clayey.

Typical pedon of Wasda muck, 0 to 2 percent slopes; about 0.2 mile south of the North Carolina State line on U.S. Highway 17, about 1.4 miles east of U.S. Highway 17 on a farm path, 360 feet south of the farm path (State plane coordinates 2,799,900 feet E., 983,900 feet N.):

Oap—0 to 8 inches; black (10YR 2/1) muck; weak fine granular structure; friable; common fine roots; medium acid; clear smooth boundary.

Oa—8 to 14 inches; dark reddish brown (5YR 2/2) muck; weak fine subangular blocky structure; friable; few fine roots; very strongly acid; clear smooth boundary.

A—14 to 20 inches; very dark grayish brown (10YR 3/2) mucky loam; weak fine subangular blocky structure; friable; extremely acid; clear smooth boundary.

Bg1—20 to 27 inches; dark grayish brown (10YR 4/2) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky; very strongly acid; gradual smooth boundary.

Bg2—27 to 43 inches; grayish brown (10YR 5/2) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky; very strongly acid; clear smooth boundary.

Cg1—43 to 48 inches; gray (5Y 5/1) loam; massive; friable; very strongly acid; clear smooth boundary.

Cg2—48 to 72 inches; gray (5Y 5/1) sand; single grained; loose; very strongly acid.

The solum is 40 to 60 inches thick. Reaction ranges from extremely acid to strongly acid in the solum and from strongly acid to mildly alkaline in the C horizon.

The Oap and Oa horizons have hue of 2.5YR to 5Y, value of 2 or 3, and chroma of 1 or 2. The have a combined thickness of 8 to 16 inches.

The A horizon has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 or 2. It is mucky loam, mucky sandy loam, mucky sandy clay loam, loam, sandy loam, or sandy clay loam.

The Bg horizon has hue of 10YR to 5Y, value of 2 to 7, and chroma of 1 or 2. In some pedons it has few or common mottles in the middle and lower parts. It is commonly sandy clay loam, but ranges to sandy loam

or clay loam. In some pedons it has thin lenses of sand and clay.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is greenish gray or dark greenish gray. It is typically loamy sand or sand, but in some pedons has stratified layers of sandy clay loam, clay loam, silty clay, or clay.

Yeopim Series

The Yeopim series consists of moderately well drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Yeopim soils are commonly adjacent to Chapanoke, Perquimans, and Roanoke soils. Chapanoke soils are somewhat poorly drained. Perquimans soils are poorly drained. Roanoke soils are poorly drained and clayey.

Typical pedon of Yeopim silt loam, 0 to 2 percent slopes; about 0.2 mile southwest of the intersection of U.S. Highway 158 and Secondary Road 1139, about 100 feet southeast of U.S. Highway 158, in a cultivated field (State plane coordinates 2,830,900 feet E., 945,700 feet N.):

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; few fine roots; few fine vesicular pores; slightly acid; abrupt smooth boundary.

Bt1—7 to 15 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable, slightly sticky; few fine vesicular pores; few faint clay films on faces of peds; few fine flakes of mica; slightly acid; gradual smooth boundary.

Bt2—15 to 24 inches; light yellowish brown (10YR 6/4) silty clay loam; common medium distinct light gray (10YR 7/2) and few fine distinct strong brown (7.5YR 5/8) mottles; friable, slightly sticky; few faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt3—24 to 42 inches; light yellowish brown (2.5Y 6/4) loam; few medium distinct light gray (2.5Y 7/2) and common medium distinct yellow (10YR 7/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; few fine flakes of mica; few opaques; strongly acid; gradual wavy boundary.

Cg—42 to 64 inches; light gray (10YR 7/1) fine sandy loam; many common distinct pale yellow (2.5Y 7/4) and few fine distinct strong brown (7.5YR 5/6) mottles; massive; friable; few fine flakes of mica; few opaques; medium acid; gradual wavy boundary.

C—64 to 72 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; common medium distinct gray (10YR 6/1) and few fine prominent strong brown (7.5YR 5/6) mottles; massive; friable, slightly sticky; few fine flakes of mica; few opaques; medium acid.

The solum extends to a depth of 40 to 60 inches. Reaction ranges from extremely acid to medium acid, except where the surface layer has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4. In pedons where value is 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 6. It is loam, silt loam, fine sandy loam, or very fine sandy loam.

The Bt horizon generally has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. In some pedons, however, the lower part of the horizon has chroma of 1 to 8 or has low-chroma mottles. The Bt horizon is commonly silty clay loam, clay loam, or loam, but in some pedons has thin layers of silt loam, sandy clay loam, fine sandy loam, or very fine sandy loam.

The C or 2C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 6. It is typically sandy or loamy, but in some pedons has thin strata of clay.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey. A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

CMAI (cumulative mean annual increment). The age or rotation at which growing stock of a forest produces the greatest annual growth (for that time period). It is the age at which periodic annual growth and mean annual growth are equal.

Coarse textured soil. Sand or loamy sand.

Coastal Plain. The physiographic region of eastern North Carolina that consists of ocean-deposited sediments of sand, silt, and clay. These areas of sediments are level to rolling and vary in thickness.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dbh (diameter at breast height). The diameter of a tree at 4.5 feet above the ground level on the uphill side.

Depth class. Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion classes. Classes based on estimates of past erosion. The classes are as follows:

Class 1.—Soils that have lost some of the original A horizon but on the average less than 25 percent

of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most of the area, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.

Class 2.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.

Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most cultivated areas of class 3 erosion, material that was below the original A horizon is exposed. The plow layer consists entirely or largely of this material.

Class 4.—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

Erosion hazard. Terms describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in tons per acre (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per acre	none
Less than 1 ton per acre	slight
1 to 5 tons per acre	moderate
5 to 10 tons per acre	severe
More than 10 tons per acre	very severe

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Flooding. The temporary covering of the soil surface by flowing water from any source, such as overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). The duration of flooding is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month).

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Geomorphic surface. A part of the surface of the land that represents an episode of landscape development and consists of one or more landforms. It is a mappable part of the land surface that is defined in terms of morphology (relief, slope, aspect, etc.); origin (erosional, constructional, etc.); age (absolute or relative); and stability of component landforms.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr layer.—Consolidated rock (weathered bedrock) beneath the soil that can be dug with difficulty with hand tools. The soft bedrock commonly underlies a C horizon, but can be directly below an A or a B horizon.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The hard bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interstream divide (or interstream area). The nearly level land between drainageways in relatively undissected parts of the Coastal Plain. It is in areas on uplands, low marine terraces, and stream terraces. Soils in these areas are generally poorly drained or very poorly drained.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy. A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Low strength. The soil is not strong enough to support loads.

Marsh. Periodically wet or continually flooded areas where the surface is not deeply submerged. These areas generally are covered with sedges, cattails, rushes, or other hydrophytic plants. Subgroups are:

Freshwater.—Lowland areas bordering rivers, creeks, and lakes that are flooded by fresh water and dominated by halophobic (salt-intolerant) plants.

Salt.—Lowland areas bordering coastal islands, sounds, bays, and sloughs that are flooded by salt water and dominated by halophytic (salt-tolerant) plants.

Tidal.—Lowland areas bordering rivers, creeks, and sloughs and traversed by interlacing channels. During high tides these areas are inundated by either salt water or brackish water. They are dominated by halophytic (salt-tolerant) plants.

Mean annual increment. The average yearly volume of a stand of trees from the year of origin to the age under consideration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Opaques. Dark, sand-sized minerals that are resistant to weathering, consisting mostly of iron or titanium.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affects the specified use.

Permeability. The quality of the soil that enables water

to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Pocosin. Waterlogged land in large, flat interstream areas that are elevated above the distant flood plains. The soils are typically high in content of organic matter and support plants that are tolerant of wetness.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	below 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Runoff class (surface). Refers to the rate at which water flows away from the soil over the surface without infiltrating. Six classes of rate of runoff are recognized:

Ponded.—Little of the precipitation and water that runs onto the soil escapes as runoff, and free water stands on the surface for significant periods. The amount of water that is removed from ponded areas by movement through the soil, by plants, or by evaporation is usually greater than the total rainfall. Ponding normally occurs on level and nearly level soils in depressions. The water depth may fluctuate greatly.

Very slow.—Surface water flows away slowly, and free water stands on the surface for long periods or immediately enters the soil. Most of the water passes through the soil, is used by plants, or evaporates. The soils are commonly level or nearly level or are very porous.

Slow.—Surface water flows away so slowly that free water stands on the surface for moderate periods or enters the soil rapidly. Most of the water passes through the soil, is used by plants, or evaporates. The soils are nearly level or very gently sloping, or they are steeper but absorb precipitation very rapidly.

Medium.—Surface water flows away so rapidly that free water stands on the surface for only short

periods. Part of the precipitation enters the soil and is used by plants, is lost by evaporation, or moves into underground channels. The soils are nearly level or gently sloping and absorb precipitation at a moderate rate, or they are steeper but absorb water rapidly.

Rapid.—Surface water flows away so rapidly that the period of concentration is brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly moderately steep or steep and have moderate or slow rates of absorption.

Very rapid.—Surface water flows away so rapidly that the period of concentration is very brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly steep or very steep and absorb precipitation slowly.

Saline soil. A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy. A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seasonal high water table. The highest level of a saturated zone (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey area slope classes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil map unit. A kind of soil or miscellaneous area or a combination of two or more soils or one or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey. They are generally designed to reflect significant differences in use and management.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsidence. A pronounced reduction in volume in some drained soils because of the removal of water, shrinkage of organic material, and the oxidation of organic compounds. Generally associated with soils that have a high content of organic matter.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The textural classes are defined as follows:

Sands (coarse sand, sand, fine sand, and very fine sand).—Soil material in which the content of sand is 85 percent or more and the percentage of silt plus 1½ times the percentage of clay does not exceed 15.

Loamy sands (loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand).—Soil material in which, at the upper limit, the content of sand is 85 to 90 percent and the percentage of silt plus 1½ times the percentage of clay is not less than 15; at the lower limit, the content of sand is 70 to 85 percent and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loams (coarse sandy loam, sandy loam, fine sandy loam, and very fine sandy loam).—Soil material in which the content of clay is 20 percent or less, the percentage of silt plus twice the percentage of clay exceeds 30, and the content of sand is 52 percent or more or soil material in which the content of clay is less than 7 percent, the content of silt is less than 50 percent, and the content of sand is 43 to 52 percent.

Loam.—Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam.—Soil material that contains 50 or more percent silt and 12 to 27 percent clay or 50 to 80 percent silt and less than 12 percent clay.

Silt.—Soil material that contains 80 or more percent silt and less than 12 percent clay.

Sandy clay loam.—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 or more percent sand.

Clay loam.—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Silty clay loam.—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Sandy clay.—Soil material that contains 35 or more percent clay and 45 or more percent sand.

Silty clay.—Soil material that contains 40 or more percent clay and 40 or more percent silt.

Clay.—Soil material that contains 40 or more percent clay, less than 45 percent sand, and less than 40 percent silt.

Thin layer (in tables). A layer of otherwise suitable soil

material that is too thin for the specified use.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Underlying material. Technically, the C horizon; the part of the soil below the biologically altered A and B horizons.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Water table (perched). A saturated zone of water in the soil standing above an unsaturated zone.

Water table (seasonal high). The highest level of a saturated zone in the soil (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-81 at Elizabeth City, North Carolina)

Month	Temperature						Precipitation				
				2 Years in 10 will have--				2 Years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	51.1	30.5	40.8	74	10	43	3.94	2.47	5.26	8	1.0
February----	53.0	32.0	42.5	76	13	40	3.81	2.29	5.16	7	.5
March-------	61.0	39.3	50.2	84	21	129	4.09	2.57	5.46	8	.3
April-------	71.1	47.9	59.5	90	29	290	2.93	1.63	4.07	6	.0
May---------	77.6	56.5	67.1	93	37	530	3.93	2.05	5.57	7	.0
June--------	84.2	64.3	74.3	97	47	729	3.95	2.19	5.49	6	.0
July--------	87.6	68.8	78.2	97	54	874	5.73	2.81	8.27	8	.0
August------	86.7	68.3	77.5	96	53	853	6.01	2.86	8.72	7	.0
September---	81.8	62.4	72.1	94	44	663	4.68	1.48	7.29	5	.0
October-----	71.9	50.5	61.2	87	28	347	3.87	1.28	5.99	5	.0
November----	63.4	41.1	52.3	81	22	123	2.86	1.35	4.15	5	.0
December----	54.3	33.3	43.8	75	14	64	3.17	1.82	4.36	6	.6
Yearly:											
Average---	70.3	49.6	60.0	---	---	---	---	---	---	---	---
Extreme---	---	---	---	99	9	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,685	48.97	42.62	55.24	78	2.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-81 at Elizabeth City, North Carolina)

Probability	Temperature 24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 30	Apr. 7	Apr. 21
2 years in 10 later than--	Mar. 20	Apr. 1	Apr. 17
5 years in 10 later than--	Mar. 2	Mar. 20	Apr. 8
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 6	Oct. 26	Oct. 20
2 years in 10 earlier than--	Nov. 13	Nov. 1	Oct. 25
5 years in 10 earlier than--	Nov. 27	Nov. 13	Nov. 3

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-81 at Elizabeth City, North Carolina)

Probability	Daily minimum temperature during growing season: Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	231	211	194
8 years in 10	245	220	199
5 years in 10	271	237	209
2 years in 10	298	254	218
1 year in 10	315	263	224

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AaA	Altavista fine sandy loam, 0 to 2 percent slopes	2,661	1.3
AtA	Augusta fine sandy loam, 0 to 2 percent slopes	1,185	0.6
BaA	Belhaven muck, 0 to 2 percent slopes	13,642	6.7
BoA	Bojac loamy sand, 0 to 3 percent slopes	1,631	0.8
CfA	Cape Fear silt loam, 0 to 2 percent slopes	3,214	1.6
ChA	Chapanoke silt loam, 0 to 2 percent slopes	1,690	0.8
CoA	Chowan silt loam, 0 to 2 percent slopes, frequently flooded	5,518	2.7
DoA	Dorovan muck, 0 to 1 percent slopes, frequently flooded	25,589	12.6
HoA	Hobonny muck, 0 to 1 percent slopes, frequently flooded	655	0.3
HyA	Hyde silt loam, 0 to 2 percent slopes	6,200	3.0
MuA	Munden loamy sand, 0 to 2 percent slopes	1,705	0.8
NoA	Nimmo sandy loam, 0 to 2 percent slopes	1,640	0.8
PeA	Perquimans silt loam, 0 to 2 percent slopes	16,999	8.3
PtA	Portsmouth fine sandy loam, 0 to 2 percent slopes	7,281	3.6
PuA	Pungo muck, 0 to 2 percent slopes	24,319	11.9
RoA	Roanoke silt loam, 0 to 2 percent slopes	15,147	7.4
RpA	Roper muck, 0 to 2 percent slopes	6,160	3.0
SeA	Seabrook fine sand, 0 to 2 percent slopes	788	0.4
StA	State fine sandy loam, 0 to 2 percent slopes	752	0.4
StB	State fine sandy loam, 2 to 6 percent slopes	210	0.1
ToA	Tomotley fine sandy loam, 0 to 2 percent slopes	12,591	6.2
Ud	Udorthents, loamy	558	0.3
WdA	Wasda muck, 0 to 2 percent slopes	1,490	0.7
YeA	Yeopim silt loam, 0 to 2 percent slopes	2,221	1.1
	Water	49,924	24.6
	Total	203,770	100.0

TABLE 5.--LAND CAPABILTY AND YIELDS PER ACRE OF CROPS

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Wheat	Irish potatoes	Cabbage
		Bu	Bu	Bu	Cwt	Tons
AaA----------------------- Altavista	IIw	130	45	55	---	---
AtA----------------------- Augusta	IIIw	120	40	45	200	12
BaA----------------------- Belhaven	IVw* VIIw**	120 ---	40 ---	40 ---	--- ---	--- ---
BoA----------------------- Bojac	IIs	90	30	40	---	---
CfA----------------------- Cape Fear	IIIw* VIw**	135 ---	45 ---	55 ---	--- ---	--- ---
ChA----------------------- Chapanoke	IIw* IIIw**	130 100	45 35	55 45	--- ---	12 10
CoA----------------------- Chowan	VIIw	---	---	---	---	---
DoA----------------------- Dorovan	VIIw	---	---	---	---	---
HoA----------------------- Hobonny	VIIw	---	---	---	---	---
HyA----------------------- Hyde	IIIw* Vw**	140 ---	55 ---	65 ---	200 ---	15 ---
MuA----------------------- Munden	IIw	110	40	45	200	---
NoA----------------------- Nimmo	IIIw* IVw**	120 ---	40 ---	50 ---	190 ---	12 ---
PeA----------------------- Perquimans	IIIw* VIw**	140 ---	50 ---	65 ---	220 ---	13 ---
PtA----------------------- Portsmouth	IIIw* VIw**	135 ---	50 ---	60 ---	200 ---	--- ---
PuA----------------------- Pungo	IVw* VIIw**	100 ---	25 ---	30 ---	--- ---	--- ---
RoA----------------------- Roanoke	IIIw* IVw**	120 ---	40 ---	45 ---	--- ---	--- ---
RpA----------------------- Roper	IIIw* VIw**	140 ---	50 ---	55 ---	200 ---	--- ---
SeA----------------------- Seabrook	IIIs	75	30	35	---	---
StA----------------------- State	I	130	45	55	200	12

See footnotes at end of table

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Wheat	Irish potatoes	Cabbage
		Bu	Bu	Bu	Cwt	Tons
StB----------------------- State	IIe	120	40	55	200	12
ToA----------------------- Tomotley	IIIw*	135	45	50	---	15
	IVw**	---	---	---	---	---
Ud------------------------ Udorthents	VIIe	---	---	---	---	---
WdA----------------------- Wasda	IIIw*	135	45	50	200	---
	VIw**	---	---	---	---	---
YeA----------------------- Yeopim	IIw	130	45	55	---	---

* Drained.
** Undrained.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
AaA: Altavista	9A	Slight	Slight	Slight	Moderate	Loblolly pine	91	133	Loblolly pine.
						Longleaf pine	87	117	
						White oak	77	59	
						Shortleaf pine	---	---	
						Sweetgum	---	---	
						Red maple	---	---	
						Yellow-poplar	---	---	
						Southern red oak	---	---	
						Water oak	---	---	
						American beech	---	---	
						Hickory	---	---	
AtA: Augusta	9W	Slight	Moderate	Slight	Severe	Loblolly pine	90	131	Loblolly pine, slash pine, sweetgum, American sycamore, yellow-poplar, cherrybark oak.
						Sweetgum	90	106	
						American sycamore	90	98	
						White oak	80	62	
						Southern red oak	80	62	
						Water oak	---	---	
						Shortleaf pine	---	---	
						Red maple	---	---	
						Yellow-poplar	---	---	
						American beech	---	---	
BaA: Belhaven	6W	Slight	Severe	Severe	Severe	Loblolly pine	65	85	Loblolly pine.
						Pond pine	60	39	
						Sweetgum	---	---	
						Red maple	---	---	
						Blackgum	---	---	
BoA: Bojac	8S	Slight	Slight	Moderate	Moderate	Loblolly pine	80	110	Loblolly pine, sweetgum.
						Southern red oak	70	52	
						Virginia pine	---	---	
						Sweetgum	80	79	
						White oak	---	---	
CfA: Cape Fear	11W	Slight	Severe	Severe	Severe	Loblolly pine	100	154	Loblolly pine.
						Sweetgum	---	---	
						Willow oak	86	81	
						Water oak	---	---	
						Water tupelo	---	---	
						Baldcypress	---	---	
						Red maple	---	---	
						Swamp white oak	---	---	
						Atlantic white cedar	---	---	
ChA: Chapanoke	9W	Slight	Moderate	Slight	Severe	Loblolly pine	90	131	Loblolly pine, sweetgum, American sycamore.
						Sweetgum	---	---	
						Yellow-poplar	---	---	
						Water oak	---	---	
						Southern red oak	---	---	
						Red maple	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
CoA------------- Chowan	9W	Slight	Severe	Severe	Severe	Water tupelo--------	84	118	Baldcypress, green ash.
						Green ash-----------	98	79	
						Sweetgum------------	---	---	
						Baldcypress---------	---	---	
						Red maple-----------	---	---	
						Pond pine-----------	---	---	
						Atlantic white cedar	---	---	
DoA------------- Dorovan	7W	Slight	Severe	Severe	Severe	Blackgum------------	70	100	Baldcypress.
						Sweetbay------------	---	---	
						Baldcypress---------	---	---	
						Green ash-----------	---	---	
						Red maple-----------	---	---	
						Water tupelo--------	---	---	
HyA------------- Hyde	10W	Slight	Severe	Severe	Severe	Loblolly pine-------	96	145	Loblolly pine, sweetgum.
						Sweetgum------------	---	---	
						Water oak-----------	---	---	
						Pond pine-----------	---	---	
						Red maple-----------	---	---	
						Green ash-----------	---	---	
						Yellow-poplar-------	---	---	
						Willow oak----------	---	---	
						Blackgum------------	---	---	
						Water tupelo--------	---	---	
						Baldcypress---------	---	---	
MuA------------- Munden	9W	Slight	Moderate	Moderate	Moderate	Loblolly pine-------	90	131	Loblolly pine.
						Sweetgum------------	90	106	
						White oak-----------	76	58	
						Water oak-----------	---	---	
						Yellow-poplar-------	---	---	
						American beech------	---	---	
						Red maple-----------	---	---	
NoA------------- Nimmo	10W	Slight	Moderate	Moderate	Severe	Loblolly pine-------	95	142	Loblolly pine, sweetgum.
						Sweetgum------------	95	122	
						White oak-----------	80	62	
						Water oak-----------	80	74	
						Red maple-----------	---	---	
						Yellow-poplar-------	---	---	
						Willow oak----------	---	---	
PeA------------- Perquimans	10W	Slight	Moderate	Moderate	Severe	Loblolly pine-------	94	140	Loblolly pine.
						Sweetgum------------	---	---	
						Water oak-----------	---	---	
						Willow oak----------	---	---	
						Green ash-----------	---	---	
PtA------------- Portsmouth	11W	Slight	Severe	Severe	Severe	Loblolly pine-------	101	156	Loblolly pine, sweetgum.
						Sweetgum------------	---	---	
						Red maple-----------	---	---	
						Water oak-----------	---	---	
						Willow oak----------	---	---	
						Sweetbay------------	---	---	
						Redbay--------------	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
PuA: Pungo	2W	Slight	Severe	Severe	Severe	Pond pine	55	33	Pond pine, loblolly pine.
						Loblolly pine	60	76	
						Red maple	---	---	
						Sweetbay	---	---	
						Baldcypress	---	---	
						Swamp tupelo	---	---	
						Atlantic white cedar	---	---	
RoA: Roanoke	9W	Slight	Severe	Severe	Severe	Loblolly pine	86	123	Loblolly pine, sweetgum, yellow-poplar.
						Willow oak	76	68	
						Sweetgum	90	106	
RpA: Roper	8W	Slight	Severe	Severe	Severe	Loblolly pine	80	110	Loblolly pine, sweetgum.
						Pond pine	---	---	
						Sweetgum	---	---	
						Water oak	---	---	
						Red maple	---	---	
						Blackgum	---	---	
						Baldcypress	---	---	
						Water tupelo	---	---	
SeA: Seabrook	8S	Slight	Moderate	Moderate	Slight	Loblolly pine	81	112	Loblolly pine, longleaf pine.
						Longleaf pine	---	---	
						Slash pine	---	---	
						Southern red oak	---	---	
						Sweetgum	---	---	
						Red maple	---	---	
						Yellow-poplar	---	---	
						Water oak	---	---	
						Willow oak	---	---	
						American beech	---	---	
StA, StB: State	9A	Slight	Slight	Slight	Severe	Loblolly pine	86	123	Loblolly pine, black walnut, yellow-poplar.
						Southern red oak	85	67	
						Yellow-poplar	100	107	
						Virginia pine	---	---	
						Hickory	---	---	
						American beech	---	---	
						White oak	---	---	
ToA: Tomotley	10W	Slight	Moderate	Moderate	Severe	Loblolly pine	97	147	Loblolly pine.
						Water oak	78	71	
						Willow oak	86	81	
						Sweetgum	---	---	
						Yellow-poplar	---	---	
						Red maple	---	---	
						Water tupelo	---	---	
WdA: Wasda	8W	Slight	Severe	Severe	Severe	Loblolly pine	80	110	Loblolly pine, sweetgum.
						Pond pine	---	---	
						Sweetgum	---	---	
						Water oak	---	---	
						Red maple	---	---	
						Blackgum	---	---	
						Water tupelo	---	---	
						Baldcypress	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
YeA------------- Yeopim	9A	Slight	Slight	Slight	Severe	Loblolly pine-------	91	133	Loblolly pine, yellow-poplar, sweetgum, American sycamore.
						Sweetgum------------	---	---	
						Yellow-poplar-------	---	---	
						Southern red oak----	---	---	
						White oak-----------	---	---	
						Red maple-----------	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 7.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AaA: Altavista	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
AtA: Augusta	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
BaA: Belhaven	Severe: wetness, excess humus.	Severe: wetness, excess humus, too acid.	Severe: excess humus, wetness, too acid.	Severe: wetness, excess humus.	Severe: too acid, wetness, excess humus.
BoA: Bojac	Slight	Slight	Slight	Slight	Moderate: droughty.
CfA: Cape Fear	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
ChA: Chapanoke	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
CoA: Chowan	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
DoA: Dorovan	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
HoA: Hobonny	Severe: flooding, ponding, excess humus.	Severe: flooding, ponding, excess humus.	Severe: ponding, flooding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
HyA: Hyde	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MuA: Munden	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
NoA: Nimmo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PeA: Perquimans	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PtA: Portsmouth	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PuA: Pungo	Severe: wetness, excess humus.	Severe: wetness, excess humus, too acid.	Severe: excess humus, wetness, too acid.	Severe: wetness, excess humus.	Severe: wetness, excess humus, too acid.
RoA: Roanoke	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RpA: Roper	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
SeA: Seabrook	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
StA: State	Slight	Slight	Slight	Slight	Slight.
StB: State	Slight	Slight	Moderate: slope.	Slight	Slight.
ToA: Tomotley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ud. Udorthents					
WdA: Wasda	Severe: wetness, excess humus.	Improbable: excess fines.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
YeA: Yeopim	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.

TABLE 8.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AaA----------------- Altavista	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AtA----------------- Augusta	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
BaA----------------- Belhaven	Fair	Fair	Good	Good	Good	Poor	Good	Fair	Good	Fair.
BoA----------------- Bojac	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
CfA----------------- Cape Fear	Fair	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
ChA----------------- Chapanoke	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
CoA----------------- Chowan	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
DoA----------------- Dorovan	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
HoA----------------- Hobonny	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
HyA----------------- Hyde	Fair	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
MuA----------------- Munden	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
NoA----------------- Nimmo	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
PeA----------------- Perquimans	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Fair.
PtA----------------- Portsmouth	Fair	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
PuA----------------- Pungo	Fair	Fair	Good	Good	Good	Poor	Good	Fair	Good	Fair.
RoA----------------- Roanoke	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Fair.
RpA----------------- Roper	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
SeA----------------- Seabrook	Fair	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
StA, StB------------ State	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
ToA: Tomotley	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Ud. Udorthents										
WdA: Wasda	Very poor.	Fair	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
YeA: Yeopim	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

TABLE 9.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AaA--------------- Altavista	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, low strength.	Moderate: wetness.
AtA--------------- Augusta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
BaA--------------- Belhaven	Severe: excess humus, wetness.	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness.	Severe: too acid, wetness, excess humus.
BoA--------------- Bojac	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Moderate: droughty.
CfA--------------- Cape Fear	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
ChA--------------- Chapanoke	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness.
CoA--------------- Chowan	Severe: excess humus, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
DoA--------------- Dorovan	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: ponding, flooding, excess humus.
HoA--------------- Hobonny	Severe: excess humus, ponding.	Severe: flooding, low strength, ponding.	Severe: flooding, low strength, ponding.	Severe: flooding, low strength, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding, excess humus.
HyA--------------- Hyde	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
MuA--------------- Munden	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
NoA--------------- Nimmo	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PeA--------------- Perquimans	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PtA: Portsmouth	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PuA: Pungo	Severe: excess humus, wetness.	Severe: subsides, wetness, low strength.	Severe: subsides, wetness.	Severe: subsides, wetness, low strength.	Severe: subsides, wetness, low strength.	Severe: wetness, excess humus, too acid.
RoA: Roanoke	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
RpA: Roper	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, excess humus.
SeA: Seabrook	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
StA: State	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
StB: State	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: low strength.	Slight.
ToA: Tomotley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ud. Udorthents						
WdA: Wasda	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, excess humus.
YeA: Yeopim	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Moderate: wetness.

TABLE 10.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "severe," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaA: Altavista	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness, too clayey.
AtA: Augusta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
BaA: Belhaven	Severe: wetness, percs slowly.	Severe: seepage, excess humus, wetness.	Severe: seepage, wetness, too acid.	Severe: seepage, wetness.	Poor: wetness, thin layer.
BoA: Bojac	Moderate: wetness.	Severe: seepage.	Severe: wetness, seepage.	Severe: seepage.	Fair: thin layer.
CfA: Cape Fear	Severe: wetness, percs slowly.	Severe: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
ChA: Chapanoke	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
CoA: Chowan	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
DoA: Dorovan	Severe: subsides, flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding, excess humus.
HoA: Hobonny	Severe: flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, ponding.	Poor: ponding, excess humus.
HyA: Hyde	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
MuA: Munden	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
NoA: Nimmo	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
PeA: Perquimans	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PtA----------------- Portsmouth	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
PuA----------------- Pungo	Severe: subsides, wetness, percs slowly.	Severe: excess humus, wetness.	Severe: seepage, wetness, excess humus.	Severe: wetness.	Poor: wetness, excess humus, too acid.
RoA----------------- Roanoke	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
RpA----------------- Roper	Severe: wetness, percs slowly.	Severe: seepage, excess humus, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
SeA----------------- Seabrook	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
StA, StB------------ State	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, thin layer.
ToA----------------- Tomotley	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ud. Udorthents					
WdA----------------- Wasda	Severe: wetness.	Severe: excess humus, wetness.	Severe: wetness, seepage.	Severe: wetness.	Poor: wetness.
YeA----------------- Yeopim	Severe: wetness, percs slowly.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Fair: too clayey, wetness, thin layer.

TABLE 11.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Topsoil
AaA: Altavista	Fair: wetness, low strength.	Improbable: excess fines.	Fair: too clayey.
AtA: Augusta	Fair: low strength, wetness.	Improbable: excess fines.	Fair: too clayey, small stones.
BaA: Belhaven	Poor: wetness.	Improbable: excess fines.	Poor: excess humus, wetness, too acid.
BoA: Bojac	Good	Probable	Fair: too sandy.
CfA: Cape Fear	Poor: low strength, wetness.	Improbable: excess fines.	Poor: too clayey, wetness.
ChA: Chapanoke	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
CoA: Chowan	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
DoA: Dorovan	Poor: wetness.	Probable	Poor: excess humus, wetness.
HoA: Hobonny	Poor: wetness.	Improbable: excess fines.	Poor: wetness, excess humus.
HyA: Hyde	Poor: low strength, wetness.	Improbable: excess fines.	Poor: wetness.
MuA: Munden	Fair: wetness.	Probable	Fair: small stones, thin layer.
NoA: Nimmo	Poor: wetness.	Probable	Poor: wetness.
PeA: Perquimans	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
PtA: Portsmouth	Poor: wetness.	Probable	Poor: wetness.
PuA: Pungo	Poor: wetness.	Improbable: excess humus.	Poor: excess humus, wetness, too acid.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Topsoil
RoA: Roanoke	Poor: wetness.	Improbable: excess fines.	Poor: too clayey, wetness.
RpA: Roper	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
SeA: Seabrook	Fair: wetness.	Probable	Poor: too sandy.
StA, StB: State	Good	Probable	Fair: too clayey.
ToA: Tomotley	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Ud. Udorthents			
WdA: Wasda	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
YeA: Yeopim	Fair: wetness.	Probable	Fair: too clayey.

TABLE 12.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
AaA: Altavista	Moderate: seepage.	Severe: piping, wetness.	Moderate: deep to water, slow refill.	Favorable	Wetness	Favorable.
AtA: Augusta	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness.
BaA: Belhaven	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Subsides, too acid.	Wetness, soil blowing, too acid.	Wetness.
BoA: Bojac	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
CfA: Cape Fear	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
ChA: Chapanoke	Slight	Severe: wetness, piping.	Severe: cutbanks cave, slow refill.	Favorable	Wetness, erodes easily.	Wetness, erodes easily.
CoA: Chowan	Severe: seepage.	Severe: excess humus, wetness.	Severe: slow refill.	Flooding, subsides.	Wetness, flooding.	Wetness.
DoA: Dorovan	Moderate: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, flooding, subsides.	Ponding, soil blowing, flooding.	Wetness.
HoA: Hobonny	Moderate: seepage.	Severe: excess humus, ponding.	Moderate: slow refill.	Flooding, ponding, subsides.	Ponding, soil blowing.	Wetness.
HyA: Hyde	Slight	Severe: wetness.	Severe: slow refill.	Favorable	Wetness	Wetness, erodes easily.
MuA: Munden	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Droughty.
NoA: Nimmo	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, droughty.
PeA: Perquimans	Slight	Severe: wetness.	Severe: slow refill.	Favorable	Wetness, erodes easily.	Wetness, erodes easily.
PtA: Portsmouth	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, soil blowing.	Wetness.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
PuA: Pungo	Slight	Severe: excess humus, wetness.	Severe: slow refill.	Percs slowly, subsides, too acid.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
RoA: Roanoke	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, percs slowly, erodes easily.	Wetness, erodes easily, percs slowly.
RpA: Roper	Slight	Severe: wetness.	Severe: slow refill.	Subsides	Wetness, soil blowing.	Wetness, erodes easily.
SeA: Seabrook	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
StA: State	Severe: seepage.	Moderate: thin layer, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing	Favorable.
StB: State	Severe: seepage.	Moderate: thin layer, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing, slope.	Favorable.
ToA: Tomotley	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Favorable	Wetness, soil blowing.	Wetness.
Ud. Udorthents						
WdA: Wasda	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Subsides	Wetness, soil blowing.	Wetness.
YeA: Yeopim	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Favorable	Wetness	Erodes easily.

TABLE 13.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
AaA: Altavista	0-6	Fine sandy loam	ML, CL-ML, SM, SC-SM	A-4	95-100	90-100	65-99	35-60	<23	NP-7
	6-36	Clay loam, sandy clay loam, loam.	CL, CL-ML, SC, SC-SM	A-4, A-6, A-7	95-100	95-100	60-99	45-75	20-45	5-28
	36-60	Stratified sand to sandy loam.	SM, SM-SC, SP-SM	A-1, A-2, A-3, A-4	85-100	60-100	40-90	5-50	<25	NP-7
AtA: Augusta	0-6	Fine sandy loam	SM, SC-SM, ML	A-2, A-4	90-100	75-100	50-98	30-60	<25	NP-7
	6-44	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	90-100	75-100	75-100	51-80	20-45	5-25
	44-72	Stratified sand to fine sandy loam.	SM, SM-SC, SP-SM	A-1, A-2, A-3, A-4	85-100	60-100	40-90	5-50	<25	NP-7
BaA: Belhaven	0-22	Muck	PT	---	---	---	---	---	---	---
	22-72	Loam, clay loam, sandy clay loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	100	100	80-100	36-95	15-36	4-15
BoA: Bojac	0-8	Loamy sand	SM	A-2	95-100	95-100	50-100	15-30	<20	NP
	8-32	Fine sandy loam, loam, sandy loam.	ML, SM	A-2, A-4	95-100	95-100	55-100	20-60	<35	NP-10
	32-72	Stratified loamy fine sand to sand.	SM, SP, SW-SM	A-1, A-2, A-3	80-100	75-100	12-100	2-35	<20	NP
CfA: Cape Fear	0-10	Silt loam	ML, CL-ML, CL	A-4, A-6	100	95-100	85-100	60-90	20-40	3-15
	10-48	Clay loam, clay, silty clay.	ML, CL, MH, CH	A-7	100	95-100	90-100	60-85	41-65	15-35
	48-72	Stratified loam to sand.	SM, ML, SM-SC, SP-SM	A-1, A-2, A-3, A-4	85-100	60-100	40-90	5-60	<35	NP-10
ChA: Chapanoke	0-6	Silt loam	ML, CL-ML	A-4	100	100	85-100	60-90	<25	NP-7
	6-46	Silty clay loam, loam, clay loam.	CL, CL-ML	A-4, A-6, A-7	100	100	85-100	60-95	22-49	6-30
	46-72	Fine sandy loam, loamy fine sand.	SM, SC-SM, ML, CL-ML	A-2, A-4	100	100	50-85	15-55	<25	NP-7
CoA: Chowan	0-6	Silt loam	CL-ML, ML, MH	A-7-5, A-4, A-6	100	100	90-100	85-95	22-60	4-24
	6-32	Loam, silt loam, silty clay loam.	CL, MH, ML	A-7-5, A-4, A-6	100	100	90-100	85-96	22-62	6-30
	32-72	Muck	PT	---	---	---	---	---	---	NP
DoA: Dorovan	0-80	Muck	PT	---	---	---	---	---	---	---
HoA: Hobonny	0-80	Muck	PT	A-8	---	---	---	---	---	---
HyA: Hyde	0-11	Silt loam	ML	A-4	100	98-100	85-100	60-90	<35	NP-7
	11-40	Clay loam, loam, silty clay loam.	CL	A-6, A-4, A-7	100	98-100	90-100	75-95	22-42	7-20
	40-72	Variable	---	---	---	---	---	---	---	---

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
MuA-------------- Munden	0-9	Loamy sand-------	SM, SC-SM	A-2, A-4	100	90-100	55-85	15-45	<18	NP-7
	9-37	Sandy loam, loam, fine sandy loam.	SM, SC, SC-SM	A-2, A-4, A-6	100	90-100	60-95	30-75	<30	NP-15
	37-72	Fine sandy loam, loamy sand, sand.	SM, SP-SM, SC-SM	A-2, A-3	100	90-100	50-90	5-35	<18	NP-7
NoA-------------- Nimmo	0-7	Sandy loam-------	SM, SC, SC-SM, ML	A-4	100	95-100	60-85	36-60	<22	NP-10
	7-41	Loam, fine sandy loam, sandy loam.	SM, SC, ML, CL	A-2, A-4, A-6	100	95-100	60-95	30-75	<30	NP-10
	41-72	Loamy sand, fine sand, sand.	SM, SP-SM, SC-SM	A-2, A-3	100	95-100	50-80	5-35	<18	NP-7
PeA-------------- Perquimans	0-8	Silt loam--------	ML, CL-ML, CL	A-4	100	100	85-100	55-95	<30	NP-10
	8-60	Loam, silty clay loam, clay loam.	CL	A-4, A-6, A-7	100	100	90-100	75-98	22-49	8-30
	60-72	Silt loam, loam, sandy loam.	ML, CL-ML, CL	A-4	100	100	85-100	55-95	<30	NP-10
PtA-------------- Portsmouth	0-11	Fine sandy loam	SM, SC-SM, ML	A-2, A-4	98-100	98-100	65-95	30-65	<30	NP-7
	11-29	Loam, sandy clay loam, clay loam.	SC, CL-ML, CL	A-4, A-6	98-100	98-100	75-95	36-70	18-40	7-18
	29-65	Stratified coarse sand to loamy sand.	SP-SM, SP, SM	A-1, A-2, A-3	98-100	98-100	45-65	3-25	---	NP
PuA-------------- Pungo	0-6	Muck-------------	PT	---	---	---	---	---	---	---
	6-97	Muck-------------	PT	---	---	---	---	---	---	---
	97-99	Clay, silty clay, sandy clay.	CH, CL, SC	A-7, A-6	100	95-100	85-100	45-95	35-65	15-35
RoA-------------- Roanoke	0-6	Silt loam--------	SC-SM, CL-ML, CL, SC	A-4, A-6	95-100	85-100	60-100	35-90	20-35	5-16
	6-11	Clay loam, silty clay loam.	CL	A-6, A-7	95-100	85-100	80-100	80-95	35-45	14-20
	11-40	Clay, silty clay, clay loam.	CH, CL	A-7	90-100	85-100	85-100	65-95	45-70	22-40
	40-72	Stratified sand to clay.	CL-ML, GM-GC, CH, SM	A-1, A-2, A-4	40-100	35-100	25-95	15-90	10-60	NP-40
RpA-------------- Roper	0-11	Muck-------------	PT	---	---	---	---	---	---	---
	11-17	Silt loam, silty clay loam, loam.	CL	A-4, A-6	100	100	90-100	60-95	20-40	8-25
	17-41	Silt loam, silty clay loam, loam.	CL	A-4, A-6	100	100	90-100	60-95	20-40	8-25
	41-72	Variable---------	---	---	---	---	---	---	---	---
SeA-------------- Seabrook	0-7	Fine sand--------	SM, SP-SM	A-2, A-3	95-100	90-100	85-99	5-25	---	NP
	7-74	Loamy fine sand, fine sand, sand.	SM, SP-SM	A-2, A-3	95-100	90-100	85-100	5-25	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
StA, StB--------- State	0-8	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-2, A-4	95-100	95-100	45-85	25-55	<28	NP-7
	8-42	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	95-100	95-100	75-100	35-80	24-40	8-22
	42-72	Stratified sand to fine sandy loam.	SM, SC-SM, SP-SM	A-1, A-2, A-3, A-4	85-100	60-100	40-90	5-50	<25	NP-7
ToA-------------- Tomotley	0-8	Fine sandy loam	SM, SC-SM	A-2, A-4	98-100	95-100	75-99	25-50	<30	NP-7
	8-38	Fine sandy loam, sandy clay loam, clay loam.	SC-SM, SC, CL-ML, CL	A-2, A-4, A-6	98-100	95-100	75-100	30-70	20-40	6-23
	38-43	Fine sandy loam, sandy clay loam, sandy clay.	SC-SM, SC, CL-ML, CL	A-4, A-6, A-7	98-100	95-100	75-99	36-75	20-45	6-22
	43-60	Stratified sand to fine sandy loam.	SM, SM-SC, SP-SM	A-1, A-2, A-3, A-4	85-100	60-100	40-90	5-50	<25	NP-7
Ud. Udorthents										
WdA-------------- Wasda	0-14	Muck-------------	PT	---	---	---	---	---	---	NP
	14-20	Loam, fine sandy loam, mucky loam.	ML, SM	A-4	98-100	95-100	75-99	45-70	<20	NP-3
	20-43	Clay loam, sandy clay loam, sandy loam.	ML, CL, CL-ML	A-4, A-6	98-100	95-100	75-99	50-80	20-40	6-18
	43-48	Sandy loam, loam	ML, SM, CL-ML, SC-SM	A-4	98-100	95-100	75-95	45-70	<25	NP-7
	48-72	Variable---------	---	---	---	---	---	---	---	---
YeA-------------- Yeopim	0-7	Silt loam--------	ML, CL-ML	A-4	100	100	85-100	55-80	<30	NP-7
	7-42	Silty clay loam, silt loam, loam.	CL	A-4, A-6, A-7	100	100	90-100	70-90	22-49	8-30
	42-72	Stratified sand to loam.	SM, ML, SC-SM, SP-SM	A-2, A-3, A-4	98-100	98-100	50-95	5-80	<20	NP-7

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
AaA--------------	0-6	10-20	1.30-1.50	2.0-6.0	0.12-0.20	3.6-6.5	Low-----------	0.24	5	3	.5-3
Altavista	6-36	18-35	1.30-1.50	0.6-2.0	0.12-0.20	3.6-6.0	Low-----------	0.24			
	36-60	2-15	1.30-1.50	>2.0	0.02-0.12	3.6-6.0	Low-----------	0.17			
AtA--------------	0-6	10-20	1.40-1.70	2.0-6.0	0.10-0.15	4.5-6.0	Low-----------	0.20	4	3	.5-2
Augusta	6-44	20-35	1.35-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.24			
	44-72	2-15	1.30-1.50	>20.0	0.02-0.10	3.6-6.0	Low-----------	0.17			
BaA--------------	0-22	---	0.40-0.65	0.2-6.0	0.20-0.26	<4.5	Low-----------	----	---	2	20-95
Belhaven	22-72	10-35	1.30-1.45	0.2-0.6	0.12-0.20	3.6-6.5	Low-----------	0.24			
BoA--------------	0-8	3-10	1.20-1.50	6.0-20	0.05-0.10	3.6-6.5	Low-----------	0.17	3	2	.5-1
Bojac	8-32	11-16	1.35-1.55	2.0-6.0	0.08-0.16	3.6-6.5	Low-----------	0.17			
	32-72	1-8	1.30-1.50	6.0-20.0	0.02-0.07	4.5-6.0	Low-----------	0.17			
CfA--------------	0-10	12-27	1.30-1.50	0.6-6.0	0.15-0.22	4.5-6.5	Low-----------	0.15	5	5	5-15
Cape Fear	10-48	35-60	1.25-1.40	0.06-0.2	0.12-0.22	3.6-6.0	Moderate------	0.32			
	48-72	5-30	1.40-1.70	0.6-6.0	0.02-0.12	3.6-6.0	Low-----------	0.17			
ChA--------------	0-6	12-27	1.30-1.50	2.0-6.0	0.15-0.24	3.6-6.5	Low-----------	0.43	5	5	.5-2
Chapanoke	6-46	18-35	1.30-1.50	0.2-0.6	0.15-0.22	3.6-6.5	Low-----------	0.43			
	46-72	7-28	1.30-1.50	0.2-0.6	0.15-0.24	3.6-6.5	Low-----------	0.37			
CoA--------------	0-6	12-27	1.20-1.40	2.0-6.0	0.15-0.20	3.6-6.0	Low-----------	0.32	4	5	2-4
Chowan	6-32	18-35	1.40-1.60	0.2-0.6	0.15-0.20	3.6-6.0	Low-----------	0.32			
	32-72	2-12	0.40-0.65	0.2-6.0	0.20-0.26	3.6-5.0	Low-----------	----			
DoA--------------	0-80	---	0.35-0.55	0.6-2.0	0.20-0.25	3.6-4.4	--------------	----	---	---	---
Dorovan											
HoA--------------	0-80	---	0.40-0.70	0.6-2.0	0.20-0.25	3.6-5.5	Low-----------	0.15	---	---	---
Hobonny											
HyA--------------	0-11	12-27	1.30-1.50	0.6-2.0	0.13-0.20	3.6-5.5	Low-----------	0.17	5	5	3-15
Hyde	11-40	18-35	1.30-1.40	0.2-0.6	0.15-0.20	3.6-5.5	Low-----------	0.43			
	40-72	---	---	---	---	---	--------------	----			
MuA--------------	0-9	3-10	1.20-1.35	2.0-6.0	0.06-0.10	4.5-6.0	Low-----------	0.17	4	2	.5-1
Munden	9-37	8-18	1.20-1.35	0.6-6.0	0.08-0.18	4.5-6.0	Low-----------	0.17			
	37-72	2-12	1.35-1.55	2.0-20.0	0.04-0.08	4.5-6.0	Low-----------	0.17			
NoA--------------	0-7	10-20	1.20-1.35	2.0-6.0	0.08-0.16	3.6-5.5	Low-----------	0.20	4	4	1-8
Nimmo	7-41	8-18	1.20-1.35	0.6-2.0	0.08-0.18	3.6-5.5	Low-----------	0.17			
	41-72	1-8	1.35-1.55	2.0-20.0	0.04-0.08	3.6-5.5	Low-----------	0.17			
PeA--------------	0-8	12-27	1.20-1.40	2.0-6.0	0.13-0.20	4.5-6.5	Low-----------	0.37	5	5	2-8
Perquimans	8-60	18-35	1.40-1.60	0.2-0.6	0.15-0.20	4.5-6.0	Low-----------	0.43			
	60-72	8-25	1.20-1.40	0.2-0.6	0.13-0.20	4.5-6.0	Low-----------	0.37			
PtA--------------	0-11	10-20	1.30-1.40	0.6-6.0	0.12-0.18	3.6-5.5	Low-----------	0.24	5	3	3-8
Portsmouth	11-29	20-35	1.45-1.55	0.6-2.0	0.14-0.20	3.6-5.5	Low-----------	0.28			
	29-65	2-10	1.40-1.65	6.0-20	0.02-0.05	3.6-6.0	Low-----------	0.17			
PuA--------------	0-6	---	0.35-0.60	0.6-6.0	0.20-0.26	<4.5	Low-----------	----	---	2	40-90
Pungo	6-97	---	0.35-0.60	0.06-0.2	0.20-0.26	<4.5	Low-----------	----			
	97-99	35-60	1.25-1.35	0.2-6.0	0.12-0.18	3.6-5.5	Moderate------	0.24			

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
RoA-------------- Roanoke	0-6	12-27	1.20-1.50	0.6-2.0	0.14-0.20	3.6-5.5	Low-----------	0.37	4	5	.5-8
	6-11	20-35	1.20-1.50	<20	0.16-0.19	3.6-5.5	Moderate-----	0.24			
	11-40	35-60	1.35-1.65	<0.2	0.10-0.19	3.6-5.5	Moderate-----	0.24			
	40-72	5-50	1.20-1.50	0.06-20	0.04-0.14	3.6-6.5	Moderate-----	0.24			
RpA-------------- Roper	0-11	---	0.40-0.65	0.2-6.0	0.24-0.46	3.6-5.5	Low-----------	----	---	2	20-50
	11-17	18-35	1.30-1.40	0.2-0.6	0.16-0.24	3.6-5.5	Low-----------	0.43			
	17-41	18-35	1.30-1.40	0.2-0.6	0.16-0.24	3.6-7.8	Low-----------	0.43			
	41-72	---	---	---	---	3.6-7.8	--------------	----			
SeA-------------- Seabrook	0-7	2-10	1.30-1.60	6.0-20	0.05-0.11	4.5-6.5	Low-----------	0.10	5	2	.5-2
	7-74	2-12	1.30-1.60	6.0-20	0.02-0.09	4.5-6.5	Low-----------	0.10			
StA, StB--------- State	0-8	10-20	1.25-1.40	0.6-6.0	0.08-0.15	3.6-5.5	Low-----------	0.28	5	3	<2
	8-42	18-34	1.35-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Low-----------	0.28			
	42-72	2-15	1.35-1.50	>2.0	0.02-0.10	3.6-6.5	Low-----------	0.17			
ToA-------------- Tomotley	0-8	10-20	1.30-1.60	2.0-6.0	0.10-0.15	3.6-5.5	Low-----------	0.20	5	3	1-8
	8-38	18-35	1.30-1.50	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.20			
	38-43	15-45	1.30-1.60	0.2-2.0	0.12-0.18	3.6-6.0	Low-----------	0.20			
	43-60	2-15	1.35-1.50	>2.0	0.02-0.10	3.6-6.0	Low-----------	0.17			
Ud. Udorthents											
WdA-------------- Wasda	0-14	---	0.40-0.65	0.2-0.6	0.20-0.25	3.6-5.5	--------------	----	---	2	20-50
	14-20	15-25	1.20-1.50	0.6-2.0	0.14-0.20	3.6-5.5	Low-----------	0.20			
	20-43	18-35	1.35-1.60	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.20			
	43-48	8-20	1.35-1.60	0.6-2.0	0.12-0.18	5.1-7.8	Low-----------	0.24			
	48-72	---	---	---	---	---	--------------	----			
YeA-------------- Yeopim	0-7	12-27	1.20-1.40	2.0-6.0	0.15-0.20	3.6-6.0	Low-----------	0.37	5	5	.5-2
	7-42	20-35	1.40-1.60	0.2-0.6	0.15-0.20	3.6-6.0	Low-----------	0.37			
	42-72	2-25	1.40-1.60	0.6-6.0	0.15-0.20	3.6-6.0	Low-----------	0.17			

TABLE 15.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "very long," and "apparent" are explained in the text. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
AaA: Altavista	C	None	---	---	1.5-2.5	Apparent	Dec-Apr	Moderate	Moderate.
AtA: Augusta	C	None	---	---	1.0-2.0	Apparent	Dec-May	High	Moderate.
BaA: Belhaven	D	None	---	---	0-1.0	Apparent	Nov-May	High	High.
BoA: Bojac	B	None	---	---	4.0-6.0	Apparent	Nov-Apr	Low	High.
CfA: Cape Fear	D	None	---	---	0-1.0	Apparent	Nov-May	High	High.
ChA: Chapanoke	C	None	---	---	0.5-1.5	Apparent	Nov-Apr	High	High.
CoA: Chowan	D	Frequent	Very long	Nov-Apr	0-0.5	Apparent	Nov-May	High	High.
DoA: Dorovan	D	Frequent	Very long	Jan-Dec	+1-0.5	Apparent	Jan-Dec	High	High.
HoA: Hobonny	D	Frequent	Very long	Jan-Dec	+1-0	Apparent	Jan-Dec	High	High.
HyA: Hyde	B/D	None	---	---	0-1.5	Apparent	Nov-May	High	High.
MuA: Munden	B	None	---	---	1.5-2.5	Apparent	Dec-Apr	Low	High.
NoA: Nimmo	D	None	---	---	0-1.0	Apparent	Dec-Apr	Low	High.
PeA: Perquimans	D	None	---	---	0-1.0	Apparent	Nov-Apr	High	High.
PtA: Portsmouth	B/D	None	---	---	0-1.0	Apparent	Nov-May	High	High.
PuA: Pungo	D	None	---	---	0-1.0	Apparent	Nov-May	High	High.
RoA: Roanoke	D	None	---	---	0-1.0	Apparent	Nov-May	High	High.
RpA: Roper	B/D	None	---	---	0-1.5	Apparent	Nov-May	High	High.
SeA: Seabrook	C	None	---	---	2.0-4.0	Apparent	Dec-Apr	Low	Moderate.
StA, StB: State	B	None	---	---	3.0-5.0	Apparent	Dec-Apr	Moderate	High.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft				
ToA---------------- Tomotley	B/D	None---------	---	---	0-1.0	Apparent	Nov-Apr	High------	High.
Ud. Udorthents									
WdA---------------- Wasda	B/D	None---------	---	---	0-1.0	Apparent	Nov-May	High------	High.
YeA---------------- Yeopim	B	None---------	---	---	1.5-3.0	Apparent	Nov-May	Moderate	High.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Augusta	Fine-loamy, mixed, thermic Aeric Ochraquults
Belhaven	Loamy, mixed, dysic, thermic Terric Medisaprists
Bojac	Coarse-loamy, mixed, thermic Typic Hapludults
Cape Fear	Clayey, mixed, thermic Typic Umbraquults
Chapanoke	Fine-silty, mixed, thermic Aeric Ochraquults
Chowan	Fine-silty, mixed, nonacid, thermic Thapto-Histic Fluvaquents
Dorovan	Dysic, thermic Typic Medisaprists
Hobonny	Euic, thermic Typic Medisaprists
Hyde	Fine-silty, mixed, thermic Typic Umbraquults
Munden	Coarse-loamy, mixed, thermic Aquic Hapludults
Nimmo	Coarse-loamy, mixed, thermic Typic Ochraquults
Perquimans	Fine-silty, mixed, thermic Typic Ochraquults
Portsmouth	Fine-loamy over sandy or sandy-skeletal, mixed, thermic Typic Umbraquults
Pungo	Dysic, thermic Typic Medisaprists
Roanoke	Clayey, mixed, thermic Typic Ochraquults
Roper	Fine-silty, mixed, acid, thermic Histic Humaquepts
Seabrook	Mixed, thermic Aquic Udipsamments
State	Fine-loamy, mixed, thermic Typic Hapludults
Tomotley	Fine-loamy, mixed, thermic Typic Ochraquults
Udorthents	Udorthents
Wasda	Fine-loamy, mixed, acid, thermic Histic Humaquepts
Yeopim	Fine-silty, mixed, thermic Aquic Hapludults

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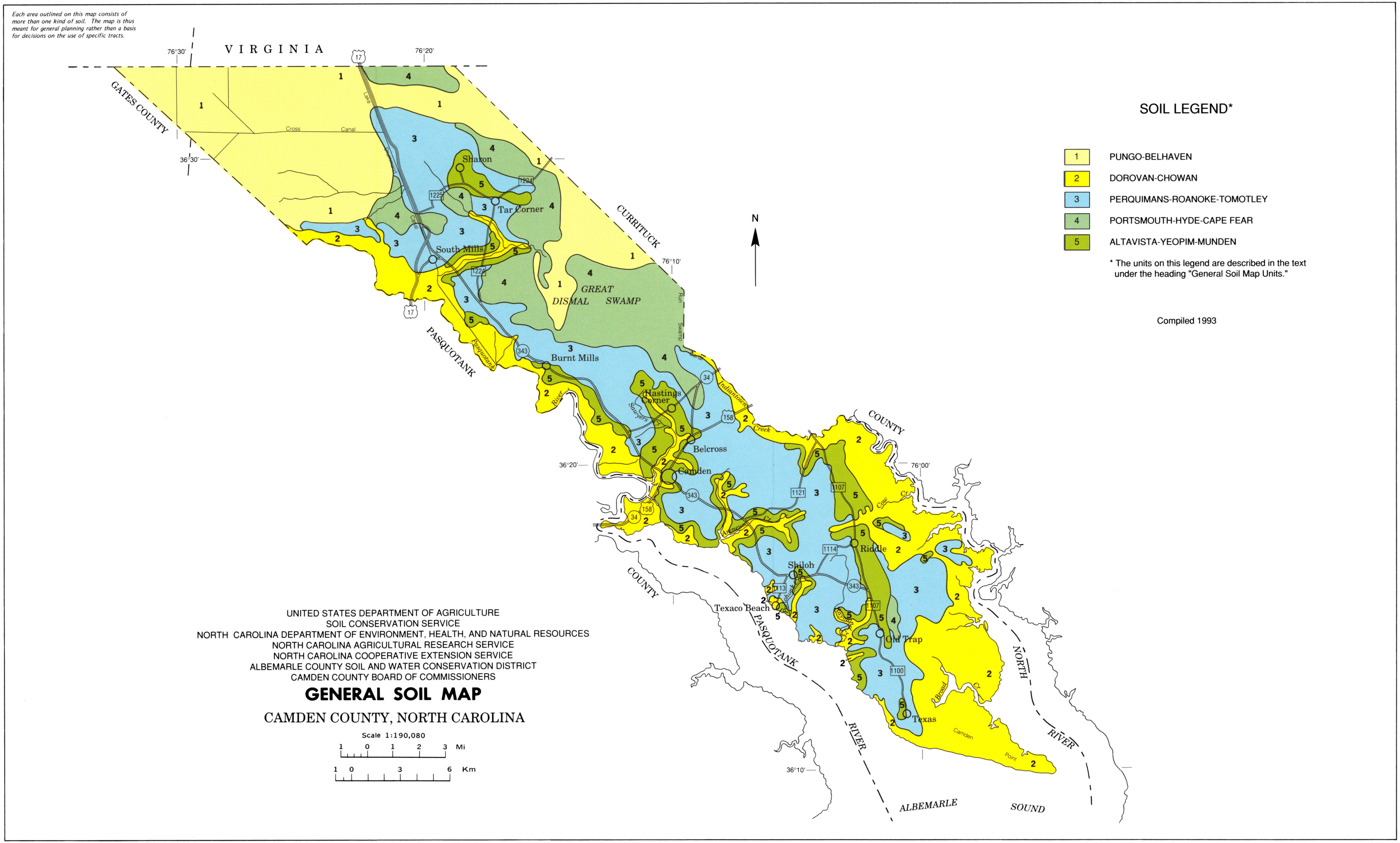
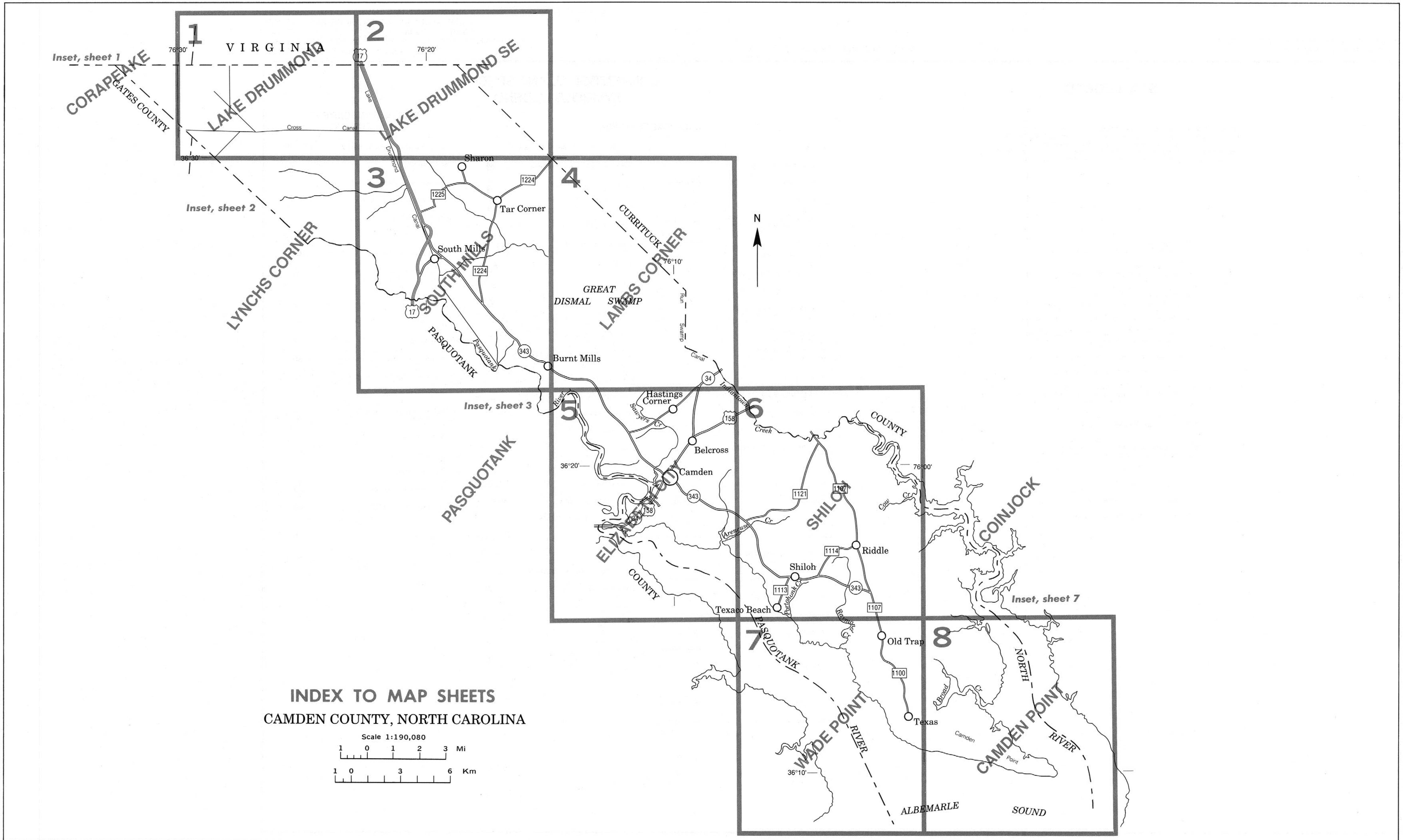

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.
VIRGINIA
GATES COUNTY
CURRITUCK
PASQUOTANK
COUNTY
GREAT DISMAL SWAMP
Sharon
Tar Corner
South Mills
Burnt Mills
Hastings Corner
Belcross
Camden
Shiloh
Riddle
Texaco Beach
Old Trap
Texas
Cross Canal
ALBEMARLE SOUND
PASQUOTANK RIVER
NORTH RIVER
76°30'
76°20'
76°10'
76°00'
36°30'
36°20'
36°10'
N
SOIL LEGEND*
1 PUNGO-BELHAVEN
2 DOROVAN-CHOWAN
3 PERQUIMANS-ROANOKE-TOMOTLEY
4 PORTSMOUTH-HYDE-CAPE FEAR
5 ALTAVISTA-YEOPIM-MUNDEN
* The units on this legend are described in the text under the heading "General Soil Map Units."
Compiled 1993
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES
NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA COOPERATIVE EXTENSION SERVICE
ALBEMARLE COUNTY SOIL AND WATER CONSERVATION DISTRICT
CAMDEN COUNTY BOARD OF COMMISSIONERS
GENERAL SOIL MAP
CAMDEN COUNTY, NORTH CAROLINA
Scale 1:190,080
1 0 1 2 3 Mi
1 0 3 6 Km



INDEX TO MAP SHEETS

CAMDEN COUNTY, NORTH CAROLINA

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

SOIL LEGEND

Soil map symbols and map units names are alphabetical. Map symbols are letters or a combination of letters and numbers. The first letter, always a capital, is the initial letter of the soil series name or miscellaneous area. The second letter is lowercase. The third letter, if used, is always a capital letter and indicates the class of slope. Symbols with only two letters indicate miscellaneous areas or soils named at categories above the series level.

SYMBOL	NAME
AaA	Altavista fine sandy loam, 0 to 2 percent slopes
AtA	Augusta fine sandy loam, 0 to 2 percent slopes
BaA	Belhaven muck, 0 to 2 percent slopes
BoA	Bojac loamy sand, 0 to 3 percent slopes
CfA	Cape Fear silt loam, 0 to 2 percent slopes
ChA	Chapanoke silt loam, 0 to 2 percent slopes
CoA	Chowan silt loam, 0 to 2 percent slopes, frequently flooded
DoA	Dorovan muck, 0 to 1 percent slopes, frequently flooded
HoA	Hobonny muck, 0 to 1 percent slopes, frequently flooded
HyA	Hyde silt loam, 0 to 2 percent slopes
MuA	Munden loamy sand, 0 to 2 percent slopes
NoA	Nimmo sandy loam, 0 to 2 percent slopes
PeA	Perquimans silt loam, 0 to 2 percent slopes
PtA	Portsmouth fine sandy loam, 0 to 2 percent slopes
PuA	Pungo muck, 0 to 2 percent slopes
RoA	Roanoke silt loam, 0 to 2 percent slopes
RpA	Roper muck, 0 to 2 percent slopes
SeA	Seabrook fine sand, 0 to 2 percent slopes
StA	State fine sandy loam, 0 to 2 percent slopes
StB	State fine sandy loam, 2 to 6 percent slopes
ToA	Tomotley fine sandy loam, 0 to 2 percent slopes
Ud	Udorthents, loamy
WdA	Wasda muck, 0 to 2 percent slopes
YeA	Yeopim silt loam, 0 to 2 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label) — Davis Airstrip

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate U.S. 17 — 17
- Federal N.C. 343 — 343
- State SR 1211 — 1211
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE
(normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small — water

PITS — w

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — AaA HyA

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

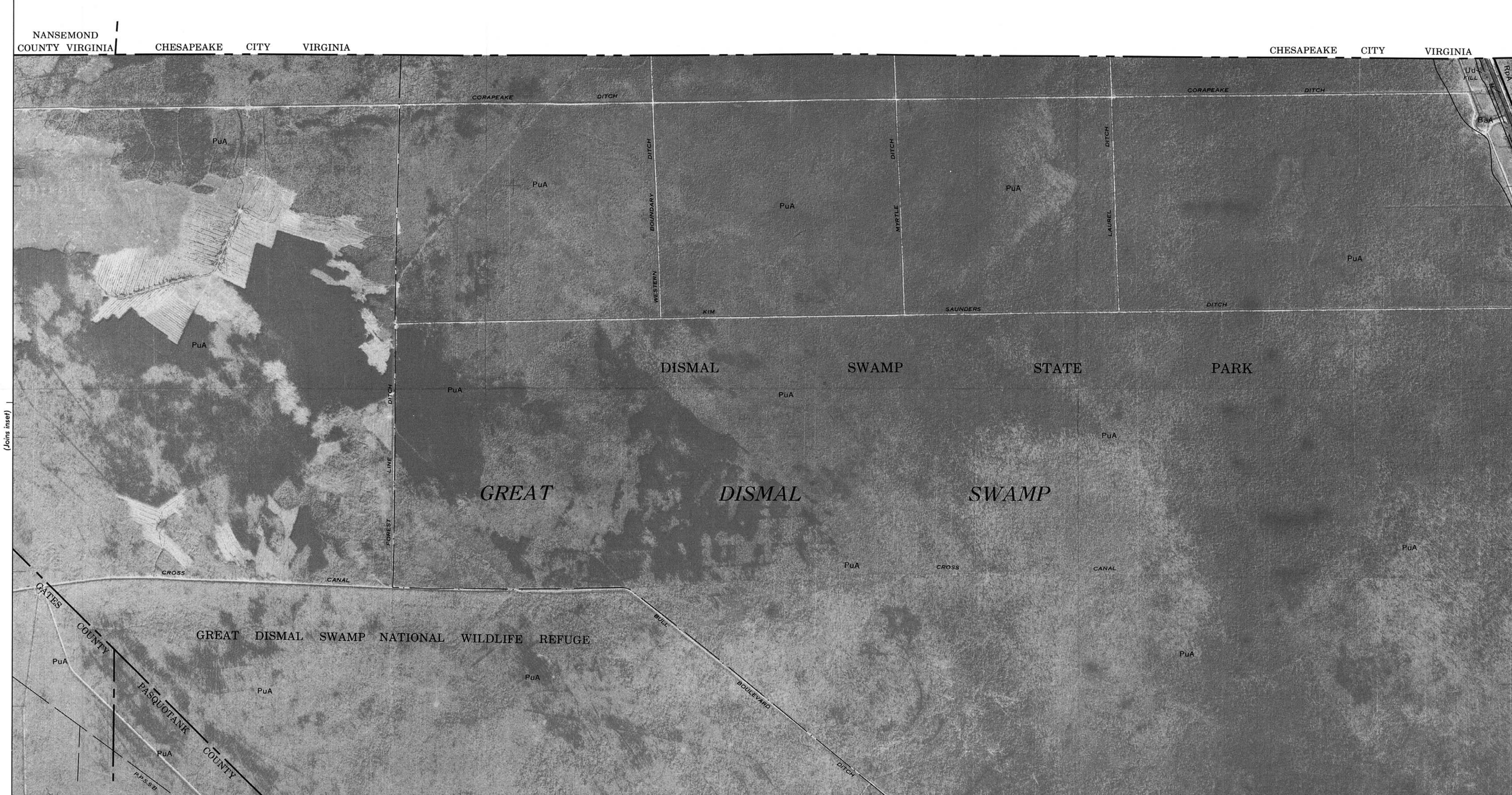
GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Dredge or Fill



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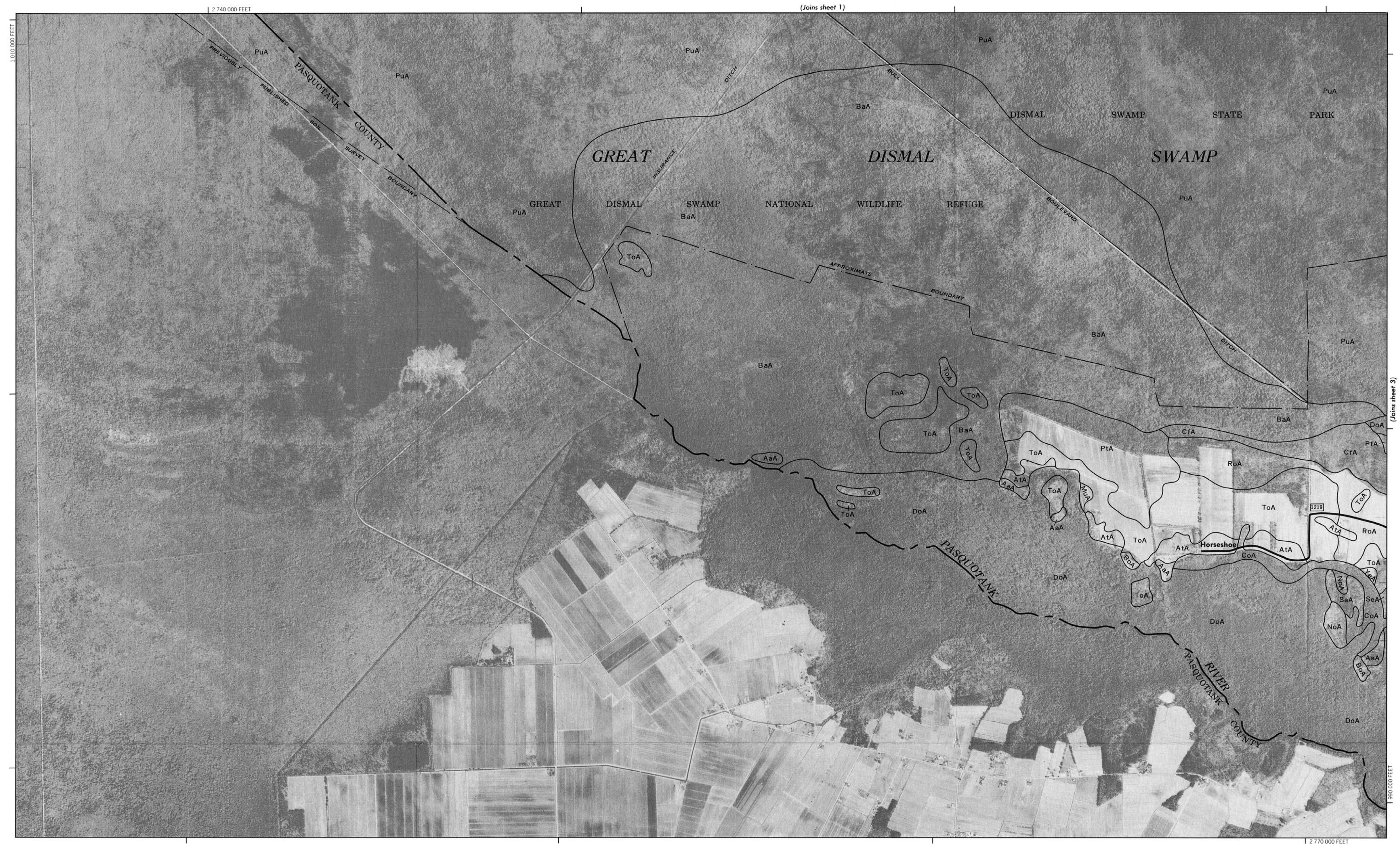
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

CAMDEN COUNTY, NORTH CAROLINA NO. 1

N



36°30'
76°22'30"

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

CAMDEN COUNTY, NORTH CAROLINA NO. 2

N

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5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

CAMDEN COUNTY, NORTH CAROLINA NO. 3

N

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5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

CAMDEN COUNTY, NORTH CAROLINA NO. 4

N

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5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

CAMDEN COUNTY, NORTH CAROLINA NO. 5

N

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5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale 1:24000

CAMDEN COUNTY, NORTH CAROLINA NO. 6

N

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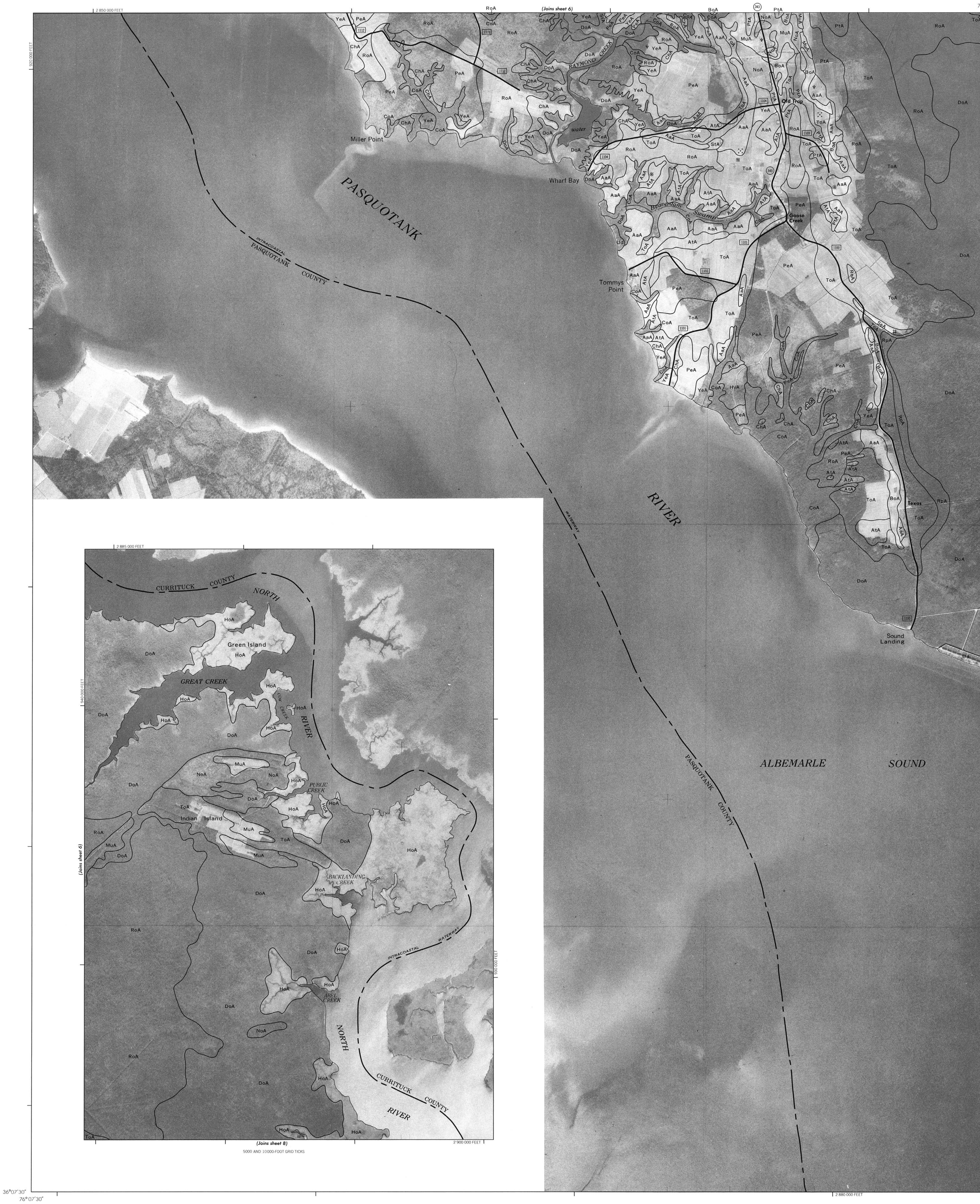

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000
CAMDEN COUNTY, NORTH CAROLINA NO. 7

N

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000
CAMDEN COUNTY, NORTH CAROLINA NO. 8

N